WORLD PETROLEUM

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APRIL 1959

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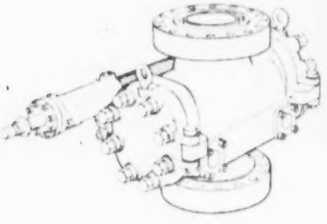
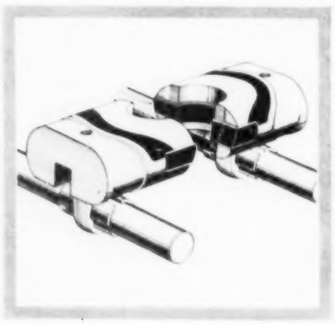
Our Type "F" Preventer is the result of continuous research and development since 1922, when we introduced the first successful preventer to the drilling industry. The Type "F" controls well pressure without fighting it. A large part of the required operating pressure in conventional preventers is used to overcome well pressure. But in the advanced Type "F" design, the actuating mechanism is always balanced to pressure. The only forces required to close or open the preventer under any condition are those necessary to overcome shaft packing and ram friction. This means the closing (and opening) pressure is always low.

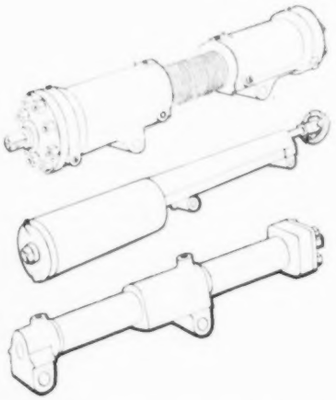


• Arms and rollers operate in Tee slots to close and open rams. Design geometry produces fast movement until rams engage pipe (or each other in blind application), at which point movement speed is reduced and sealing pressure is tremendously increased.

• Transverse ram shafts are pressure sealed at both ends affording "balanced pressure" operation. Shafts rotate — do not pull abrasives into seals as with sliding rods.



• Compact hinged bonnets allow easy access for simplified ram changing. When fully retracted the roller and arm assemblies drop free of the rams. Ram bores are relieved toward bonnets to ease ram removal.



• New simplified operators are attached to one side only.

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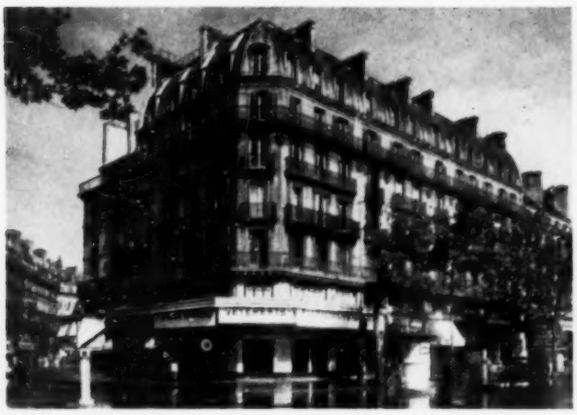

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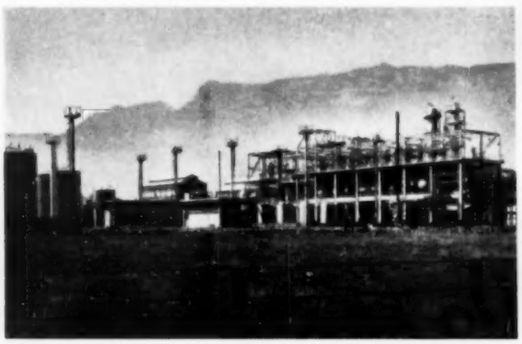
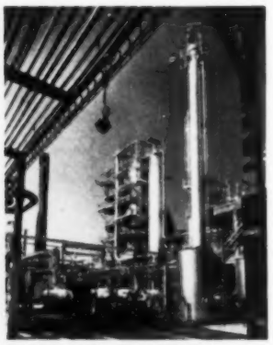


Phenol Acetone Plant

Ethylene Plant



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World Petroleum

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is an 1848 map of the Middle East, supplied through the courtesy of Marshal Rothe, Middle East Institute, 1761 N. St., N.W., Washington, D. C.

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J-57

Washington

By Joseph B. Huttlinger

Committee To Review Imports

A congressional review of the oil-imports program is likely with introduction of a bill by Senator Joseph C. O'Mahoney (D., Wyo.), to set up a new program to limit imports of crude oil and of oil products. The review will start with hearings before the Senate Public Lands Subcommittee, of which O'Mahoney is the chairman. First witnesses will be members of the Cabinet Committee on Oil Imports and other officials in charge of the current program. They will be asked to review the current program, which is under authority of the foreign-trade act of 1958. The foreign-trade act is a broad authorization to the President to do whatever he feels is needed in the event imports of any article are so high as to hurt the national security.

The O'Mahoney bill is limited to excessive imports of crude or of oil products. It sets forth clearer and more specific duties for the executive branch of the government. Under both the foreign-trade act and the O'Mahoney bill, it would be left to the executive branch to determine how much total oil imports would be allowed.

Assurance that the O'Mahoney bill would come in for attention came when nine other senators joined as co-sponsors. They are Senators Murray (D., Mont.); Chavez (D., N.M.); Carrol, (D., Colo.); McGee (D., Wyo.); Byrd (D., Va.); Yarborough (D., Texas); Mansfield (D., Mont.); Bible (D., Nev.); and Allott (R., Colo.).

The bill would set up an oil-imports administration under the Secretary of the Interior, who would determine "national import levels" each six months, limited to levels which would allow "maintenance of a vigorous level of domestic petroleum exploration and development." Import quotas would be allocated to refining companies only in proportion to plant capacities, with a limit of 40% of the total to coastal refineries. USA plants served with foreign oil by pipeline could bring in the plant's needs for crude. Special quotas would be issued where a domestic producer operating abroad faces "unreasonable drainage," for special crudes, and for the crude-equivalent of product exports. Quotas could not be transferred, and the crude must be used in the plant for which the quota is granted. Crude-oil produces, including residual oil, would be covered. Products would be charged on the basis of their crude-equivalent. Residual, in any event, would be limited to 10% of the total domestic petroleum demand.

Pipeline

Imports Vs. Price Rise

USA officials are closely watching prices of crude-oil products in the new and tougher program to curb oil imports. Most officials feel prices will not rise as a result of the program, and that any price effect will be to prevent a further downward drift. The domestic industry, they admit, has plenty of spare capacity, so no shortages are in sight. Thus, USA producers are reported to have a spare producing capacity of about three million barrels per day, and refiners have more than one million b/d to spare. Some officials admit, however, that prices could rise. If so, they feel, the government has a responsibility to protect the consumer.

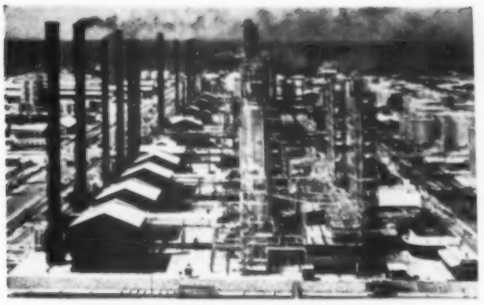
Officials of the Departments of the Interior, which works in the petroleum field, and of Justice, which handles antitrust matters, are still sensitive about a flood of letters on rising fuel-oil prices following the cold snap of last winter. For the present, officials go on the basis that the new imports will have little effect on oil prices, but merely hold imports to a fair share of the market demand. This way, they would operate much as does the crude-oil proration system in the states. First action of the government, if prices rose substantially, would be to ease the limits on imports. Only as a last resort would price controls be proposed, it is widely felt.

New Gas Bill Unlikely

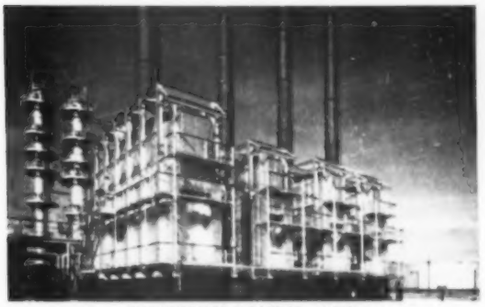
Chances of a new natural-gas bill, to ease up federal price and other controls over independent producers of gas, are slim. All nose counts indicate House and Senate Commerce Committees lack majorities for passage of a bill, and that the full membership of the House and Senate is even more heavily against a bill.

Price Rise If Depletion Cut

Consumers of gasoline have been warned that the price of gasoline would have to rise if the incentive of the income-tax depletion allowance were taken away from crude-oil and gas producers. Gordon Simpson, president of Independent Petroleum Assn., says "recent studies by our association show that an increase of at least five cents per gallon in gasoline prices would be required to make up capital requirements of the industry now provided through depletion." Foes of depletion urge reduction rather than elimination of the allowance—to 15% from the present 27½%, and that oil men should not raise prices to make up for the extra sums paid in taxes.



CRUDE HEATERS, VENEZUELA



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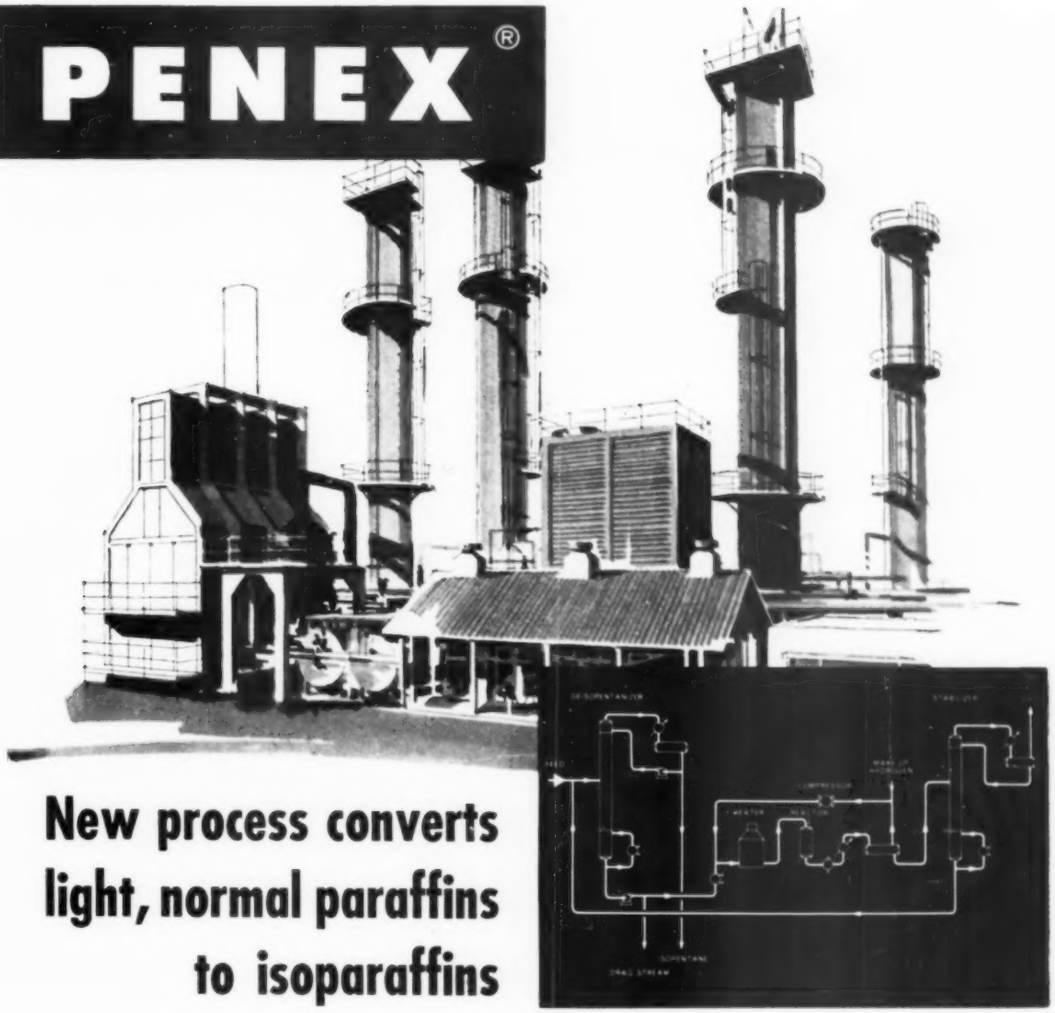

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LONDON LETTER

By Cecil W. Wood

His Excellency The Ambassador, Baron Adolph Bentinck invests W. F. C. Mackie as an Officer in the Order of Oranje Nassau.

Honor For An English Oil Man

At the Netherlands Embassy in London recently, H. E., The Ambassador Baron Adolph Bentinck invested W. F. C. Mackie, formerly manager of the Cardon refinery and a member of the board of Cia. Shell de Venezuela, as an Officer in the Order of Oranje Nassau. Mr. Mackie retired recently after 31 years' service with the Royal Dutch-Shell group. In his citation, the ambassador commended Mr. Mackie for the remarkable team spirit which he had instilled in the men of many nations engaged in the development of the refinery—now one of the the largest in South America—and in fostering the harmonious Anglo-Netherlands relationship which has prevailed throughout. To his Netherlands' colleagues, he was known as "the Burgomaster." Mrs. Mackie was presented with a bouquet of flowers. Also present at the investiture were Jonkheer J. H. Loudon, a managing director of Royal Dutch Shell; W. F. G. L. Starrenburg of NV Bataafsche Petroleum, The Hague; G. H. Stokes, of Shell Petroleum; and Paul Anthony, Mr. Mackie's son.

Carrington Thermoplastics

At Petrochemicals Ltd.'s works at Carrington (previously known as Partington), near Manchester, Shell Chemical Co. is construct ng large-scale facilities for the manufacture of polyolefin. The first stage embraces the production of 30,000 tons per year of polyethylenes and polypropylenes, including high-density polyethylenes which will be manufactured under the exclusive Ziegler license for the UK acquired by Petrochemicals Ltd.

Emergency Stocks

One of the biggest items in the civil supplementary estimates for 1958-59 is that of the Ministry of Power for an extra £6,002,600 for the purchase of additional supplies of petroleum products to go into the strategic reserves held in the UK by the ministry. It is regarded as clear that the government is taking added precautions against any future dislocation of Middle East oil supply. The Minister of Power has also told parliament that the oil companies are now raising the level of their stocks.

Such government stockpiling has been going on at a modest but steady rate for many years. The original 1958-59 estimates allowed £1,885,000 for capital expenditure on "supply, storage, and distribution of petroleum products," against £2,250,000 in 1957-58.

Trinidad Central And Canada

On January 1, Trinidad Central Oilfields Ltd. passed over all its assets in Canada to a new Canadian subsidiary—Tricentrol Ltd.—with an authorized capital of $3 million. Gross oil and gas sales in Canada for Trinidad Central account have grown in under four years to an annual rate of about $1 million, and the properties, as at July 31, 1958, were valued by J. C. Sproule & Associates, of Calgary, at $2,261,283.

UK Oil Imports In 1958

With a total of 333.5 million barrels in 1958, UK oil imports show a rise of 44.9 million barrels (15.6%) over 1957—an abnormal year, when imports were affected seriously by the Suez Canal closure and consumption was restricted by official action—and a rise of 50.8 million barrels (18.0%) over 1956. It would be more realistic to ignore changes in the individual years and to consider the average rise over the past two years as having been 9.0%.

There was very large rise in crude imports to 251.1 million barrels, and the proportion to total imports rose to 75.3% from 71.1% in 1957 and 74.9%, in 1956. Nevertheless, refined-oil imports also showed a further slight increase.

Thus throughout 1958, UK requirements demanded a daily average importation of 687,856 bbl of crude oil and 225,871 bbl of refined oils—an aggregate of 913,727 bbl.

Exports of domestically refined products totaled 59,314,457 bbl (value £93,254,755) in 1958. This compares with 44,843,743 bbl (£83,116,749) in 1957 and 54,301,429 bbl (£92,131,106) in 1956.

	QUANTITY (Thousands of Barrels)			VALUE (Millions of Pounds Sterling)		
Crude oil:	1958	1957	1956	1958	1957	1956
Total	251,068	206,955	211,700	295.9	280.2	244.7
Refined oils:						
Motor spirit	20,757	21,235	17,785	40.3	46.2	36.4
Spirit, other than motor	1,025	2,256	1,302	2.5	5.0	2.9
Kerosine	9,014	11,801	11,007	15.2	22.3	18.6
Lubricating oil	2,963	2,804	3,244	9.9	10.7	11.0
Gas oil	15,001	15,955	14,680	24.2	30.4	24.0
Diesel oil	636	1,335	1,791	1.0	2.3	2.9
Fuel oil	33,047	26,188	21,131	37.2	36.2	23.4
Other	n.a.	71	13	n.a.	0.3	0.1
Total	82,443	81,645	70,953	130.3	153.4	117.4
Crude and refined	333,511	288,600	282,658	426.2	433.6	361.1

S-T Ltd. Managing Director

J. H. Kirby has been appointed managing director of Shell Tankers Ltd. in succession to A.S.C. Hulton, who has taken up another position in the Royal Dutch-Shell group. Mr. Kirby joined Shell Petroleum in 1930, and in 1937 went to the United States where he gained experience in a number of positions. He returned to London in 1952, and joined the board of Shell Tankers on its formation in November 1953. Since July 1954, he has been deputy managing director to Mr. Hulton. A. Logan, who joined The Anglo-Saxon Petroleum Co. in 1927 and who has been technical director since November 1955, has been appointed deputy managing director of Shell Tankers.

Use Of Refinery Gas

It has been officially stated that the gas industry estimated its consumption of tail gas and other refinery surpluses may increase, in terms of coal-equivalent, from the present level of about 500,000 tons a year to two million tons in 1965.

New CBMPE Vice Chairman

J. M. Storey, managing director of Dewrance & Co. Ltd., well known engineers and valve manufacturers, has been appointed vice chairman of the Council of British Manufacturers of Petroleum Equipment. Mr. Storey, who was made a Commander of the Most Excellent Order of the British Empire (CBE) in the New Year's Honors List, was the leader of the council's Economic, Technical, and Goodwill Mission to Canada in 1957, which was such a success and which did such valuable work.

J. M. Storey, CBE; vice chairman, Council of British Manufacturers of Petroleum Equipment.

Refinery Capacity Doubled

At the Shell Haven refinery, a second crude-oil distillation unit has gone onstream costing, with tankage and ancilliary equipment, about £6½ million. With a daily capacity of 11,000 tons (80,000 bbl) of Middle East crude, this approximately doubles this refinery's capacity to about eight millions tons per annum (160,000 b/d) and, with the addition of the Stanlow, Heysham, and Ardrossan plants, brings Shell Petroleum's UK refining capacity to around 15 million tons.

Designed by Shell technologists in Holland, the new unit was engineered and built by Stone & Webster Engineering Ltd., London. Its two special features are the high degree of heat recovery, resulting in about 30% lower fuel consumption than in previous designs, and the good recovery of light hydrocarbons.

Honors For Oil Men

In the list of oil men on whom distinctions were conferred in the New Year Honors, recorded in these pages in March, it is regretted that the life peerage conferred on Sir Hartly Shawcross QC., a director of Shell Petroleum Co., was omitted. Sir Hartly has had a long and very distinguished career, and held many important government and legal appointments until he became a legal consultant with the company. At the same time, G. H. Churchill, managing direcor of The Shell Co. of the Philippines, was appointed a Commander of the British Empire (CBE).

Underground Gasification Ends

The National Coal Board has decided that further expenditure on the underground gasification of coal seams which would not otherwise be mined is no justified as a means of providing a useful supplementary source of power supply. Accordingly, the development contract with Humphreys & Glasgow Ltd. has been terminated.

UK Equipment Orders

The value of orders for materials and equipment (excluding tankers) placed in the UK by oil companies during 1958 fell by £11,984,709 to £122,065,574 as compared with 1957. This is the second successive decline from the peak to date of £153,730,621 in 1956. It will be seen from the summarized details below that the decline over the past year has been particularly heavy in the categories associated with oil exploitation—(No. 2) and tubulars (No. 8). The aggregate for these two declined by no less than £17,463,015 (40.8%) to £25,289,151. Orders for specialized equipment for refineries (No. 3), exclud.ng pumps and valves, show a welcome rise, while chemicals (No. 18) has represented 16% to 20% of the total over the past three years.

British Equipment Notes

National Iranian Oil Co. has ordered a further six Leyland Motors' Super Hippo heavy-duty trucks with staked-sided platform bodies of the same type

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(Continued from page 8)

as the 60 ordered only a few weeks before for use as road tankers.

Newman, Hender & Co., of Woodchester, Gloucestershire, issues *Brochure No. 300* (February 1959), illustrating and describing in detail the features of the Newman-McEvoy automatic self-sealing round port-through conduit gate valve for pipeline services. This is the latest addition to the range manufactured by the company.

Ruston & Hornsby Ltd., Lincolnshire, the only builders outside the USA of industrial gas turbines on a batch production system, has received a £350,000 order from Basrah Petroleum Co. for Mark TA gas turbines rated at 1,000-kw (1,260-bhp) for pumping oil in the Rumaila area. This company already has four of these gas turbines in operation which have completed over 10,000 hours of operational running; while another, in use in an Italian refinery, has completed over 25,000 hours, including a nonstop run of nearly 6,000 hours. Ruston is also delivering a gas turbine to an Imperial Chemical Industries' associate in Canada to replace a steam turbine used in polythene production.

Perkins Outboard Marine Ltd. has been formed to market the three streamlined outboard motors of 6-, 16-, and 35-hp (at 4,500 rpm), whose sole manufacturing rights abroad, apart from Italy, were recently acquired from the Oliver Corp., of Chicago; certain plant for their manufacture is also to be transferred from Chicago. These motors, which eventually will be produced entirely in England, will be sold in all world markets, including the USA.

Under the original proposal, Oliver was to secure an 11% stake in the Perkins equity in return for these manufacturing rights. Subsequently Massey-Ferguson Ltd. made an offer for Perkins' share capital, which was accepted by shareholders, and Oliver agreed to take $1, 183,000 in lieu of the shares which would have been acquired.

World Tanker Tonnage

The world total of tanker tonnage (500 tons gross register and over) afloat on January 1, 1959, was 58.1 million tons (all figures are deadweight), according to the half-yearly report of Davies Newman Ltd., London ship and oil brokers. This represents a net increase of 3.8 million tons over the July 1 total. During the latter half of 1958, about 3.8 million tons of new tankers were launched, yet another record for a 6-month period; and the world net increase for the year was 7.2 million tons. Summary details of tanker fleets, by flags, are as follows:

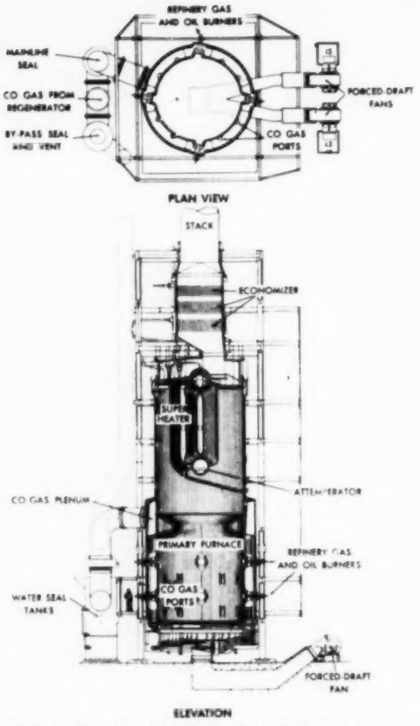
Flag	Thousands of Dwt	Flag	Thousands of Dwt
Liberia	11,752	Germany	873
Britain	9,643	Spain	535
Norway	8,770	Argentina	444
United States*	6,399	Greece	430
Panama	3,955	Brazil	282
France	2,645	Belgium	253
Italy	2,417	Finland	253
Sweden	2,279	Venezuela	239
Netherlands	1,832	Mexico	189
Japan	1,746	Portugal	147
Denmark	1,248	Others	898
USSR	892		
		Total	58,091

*Commercial fleet only.

Tanker Launchings In 1958

During 1958, merchant ships launched in the UK totaled 1,401,980 tons (all tonnages are gross); and, of this, 41.2% (577,385 tons) was represented by 48 tankers. This proportion compares with 37.9% in 1957. Ten ships of 20,000 tons and upwards were launched, and all were tankers: the four largest of these were all for BP Tanker Co., ranging from 26,000 to 27,800 tons. The UK ranks third in the world list of tanker launchings, being surpassed by Japan with 1,176,300 tons and the USA with 643,994 tons.

Lloyd's Register of Shipping annual summary of merchant ship launchings shows an even more impressive position for the proportion of tankers in the world as a whole, excluding Russia. The 429 tankers launched represented 52%, or 4,775,279 tons, out of the world launchings of 9,269,983 tons for all ships. This compares with 45% in 1957.



CO boiler developed by Babcock & Wilcox Ltd. to utilize efficiently, for steam raising, both the sensible and combustible-heat content of the exhaust gases from a catalytic cracking unit.

Largest British-Made CO Boiler

The Fawley refinery of Esso Petroleum Co. is to have Britain's largest carbon-monoxide boiler—designed, manufactured, and installed by Babcock & Wilcox Ltd. This will utilize the flue gases, rich in carbon monoxide, produced during the catalytic cracking process to generate 300,000 lb of steam per hour at a pressure of 150 psi and a temperature of 465 F.

The boiler is of the circular vertical-type surmounted by a steel chimney, with an overall height of some 250 ft, and it will be used primarily to supply steam for the catalytic cracker. It is also equipped with Babcock Multispud gas burners and oil burners for employing a supplementary fuel supply of either fuel oil or refinery gas or both.

The oil burners are used for starting-up and, combined with the refinery-gas burners, generate the initial supply of steam to the cracking unit. As the through-put of the cracking process increases, the volume of carbon-monoxide gas mixture increases, and the supplementary supply of fuel oil and/or refinery gas is reduced until a condition is reached when the ratio of supplementary fuel to carbon-monoxide flue gas burned is in the proportion of one-third to two-thirds, approximately; and, under these conditions, the boiler will operate at full capacity.

The economic advantage of this boiler lies in the fact that it is a self-contained unit which not only recovers and burns the sensible heat and heat of combustion in the carbon-monoxide flue gases from the catalytic cracker, but it can, when using only the supplementary supply of fuel, maintain a full steam supply to the refinery when the cracking unit is shut down.

Pipe Deliveries Drop

Reviewing his company's oil-industry orders in the year ended September 27, 1958, the chairman of Stewart & Lloyds—A. G. Stewart—said recently that at the beginning of the year the export order load for steel tube from oil-industry customers was sufficient to keep the works fully employed for six months ahead. It was clear, however, that a fall in the volume of new orders could be expected, and by January 1958 many of these customers were not only unable to place new orders, but in some cases were cancelling existing orders. Home and export orders fell 12%—to 256,000 tons in 1957-58 from 291,000 tons the preceding year. The volume of exports fell 7%, but Mr. Stewart said this reduction is very much smaller than the reduction in the volume of orders booked during the year, and a further substantial fall in oil-industry export dispatches must be expected in the current financial year. For the quarter ended December 31 last, dispatches were still 50% below the level of the same quarter of 1957-58, and the demand in February still showed no immediate indications of revival.

Diesel Range Extended

Davey, Paxman & Co., Ltd., of Colchester, England—one of the few British companies which will be exhibiting at the forthcoming International Petroleum Exposition at Tulsa—have extended their well-known range of diesels by introducing the Vega and Venture engines. Both series incorporate many new features in the detail design which are worthy of study by the engineer, and both have a wide range of oil-industry applications.

The entirely new, 6-, 8-, and 12-cylinder aircooled Vega engines afford a 160-466 bhp power-range addition to the Vee formation (RPH and YHX) ranges and, with a power-weight ratio in the order of 10 lb per bhp, are undoubtedly attractive compared with similar liquid-cooled engines, which have the additional weight of a radiator and cooling water.

The other new range is the Ventura which consists of 60-deg Vee-type 12- and 16-cylinder engines. These engines are basically designed as turbo pressure-charged units (with charge aircooling where necessary), giving a 1,100- to 1,735-bhp power output for industrial use, in an exceptionally compact form. In the case of the 12-cylinder engine, its dimensions are no greater than the standard Paxman 12 RPH engine in the 7-in. bore range, and its specific weight is reduced by some 60%. These advantages result from a special engine-frame design which permits a considerable degree of versatility in placing external fittings.

One of the new 8-cylinder 310-bhp aircooled Vega diesels, with power takeoff, will be a running exhibit on the Paxman stand at the Tulsa Exposition. Together with a standard 6 RPH 143-kw oilfield generating set, a standard 12 RPH 618-bhp oilfield engine will be shown as a static exhibit.

Ellesmere Port Terminal

Mobil Oil Co. Ltd. is to build a new ocean-fed terminal at Ellesmere Port, Cheshire, costing over £1 million, which will carry a full range of products to serve the densely populated areas of Cheshire, Lancashire, and Yorkshire which together account for some 20% of UK oil consumption. The main contractors are John Laing & Son Ltd., who will be in association with The H. K. Ferguson of Great Britian Ltd. so far as the mechanical and electrical work is concerned. The terminal is situated 2¼ miles from Queen Elizabeth II oil dock at the entrance to the Manchester Ship Canal, from which it will be fed by pipelines, and it will have a storage capacity initially exceeding 660,000 bbl. This new terminal will permit the distribution by Charrington, Gardner, Locket & Co. of Mobil fuel oils in the northwest of England for the first time.

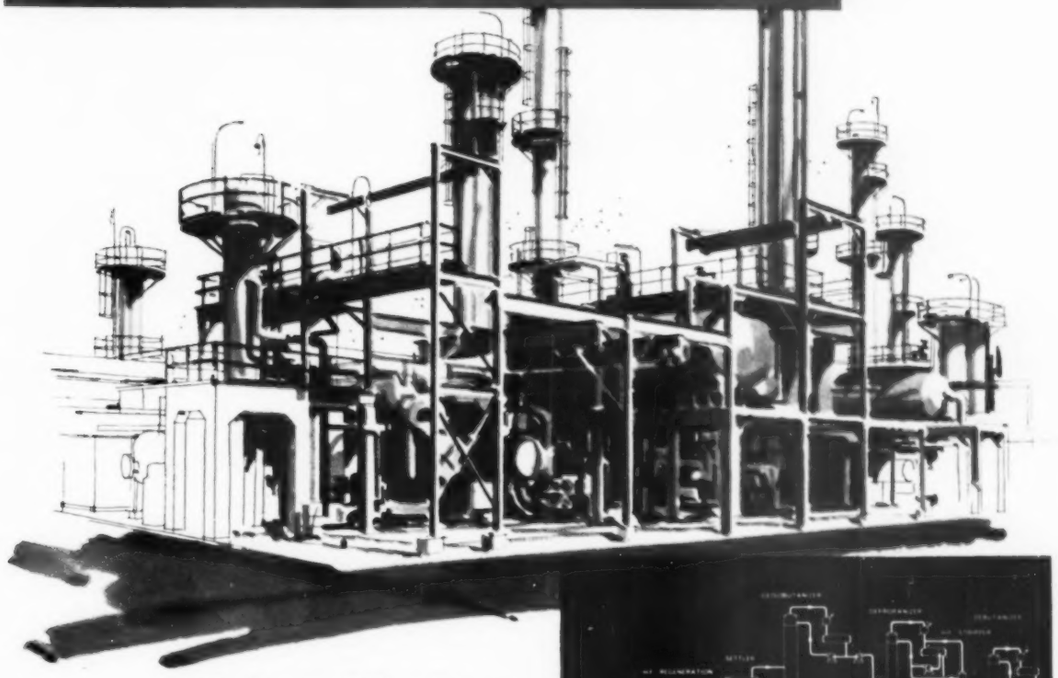
Mobil Terminal At Poole

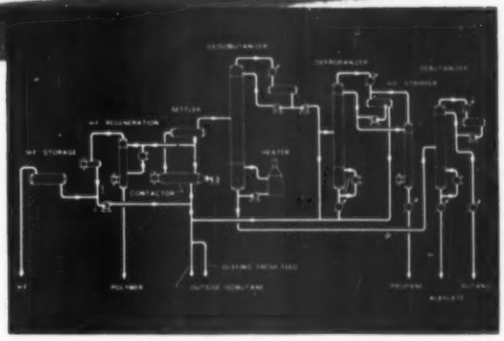
Work has started at Poole, Dorset, on a new 500,000-gallon sea-fed bulk terminal being built for Mobil Oil Co. It will be supplied by tanker from Coryton refinery to New Quay, Hamworthy, near the modern installation built by J. R. Wood & Co., Ltd., Mobil's fuel-oil distributor for the area. The two installations will be complementary, and will together store the complete range of Mobil fuels.

Personals

BYRON A. GREEN, JR., has been appointed director of services and sales for the MacPherson-Ridgeway Petroleum Equipment Co., whose headquarters are in Beirut, Lebanon. Prior to joining the company, Mr. Green was senior drilling equipment engineer for Aramco Overseas Co. at The Hague, and he spent 10 years in the petroleum engineering departments in Aramco's Saudi Arabian fields. The company offers consulting, engineering, purchasing, and service to operators and drilling contractors throughout the Middle East.

HF Alkylation





Makes Alkylate, Top Anti-Rumble Motor Fuel

A practical, economical means of producing motor alkylate, a high octane, top quality gasoline blending component, is available to petroleum refiners through the UOP "HF" Alkylation process.

"HF" Alkylation is a catalytic process which combines olefins such as propylene, butylenes and amylenes with isoparaffin (usually isobutane) to form a mixture of branched chain hydrocarbons of higher molecular weight known as alkylate. "HF" Alkylation is also widely used for producing high octane aviation gasoline.

Motor alkylate, an isoparaffin fuel component, burns with a minimum of carbon deposits even in today's modern high compression automobile engines and thus greatly reduces surface ignition and its consequent "rumble."

Another method for producing alkylate is also available to refiners through UOP. It is similar to the "HF" method but uses sulfuric acid as the catalyst. This process is licensed by Universal Oil Products Company under their own patent rights and the patent rights of Shell Oil Company, The Texas Company, The British Petroleum Company, Limited and Standard Oil Company of New Jersey.

These processes for producing alkylate afford further evidence of UOP's policy of providing the refining industry with every means for a well-rounded, profitable manufacturing operation.

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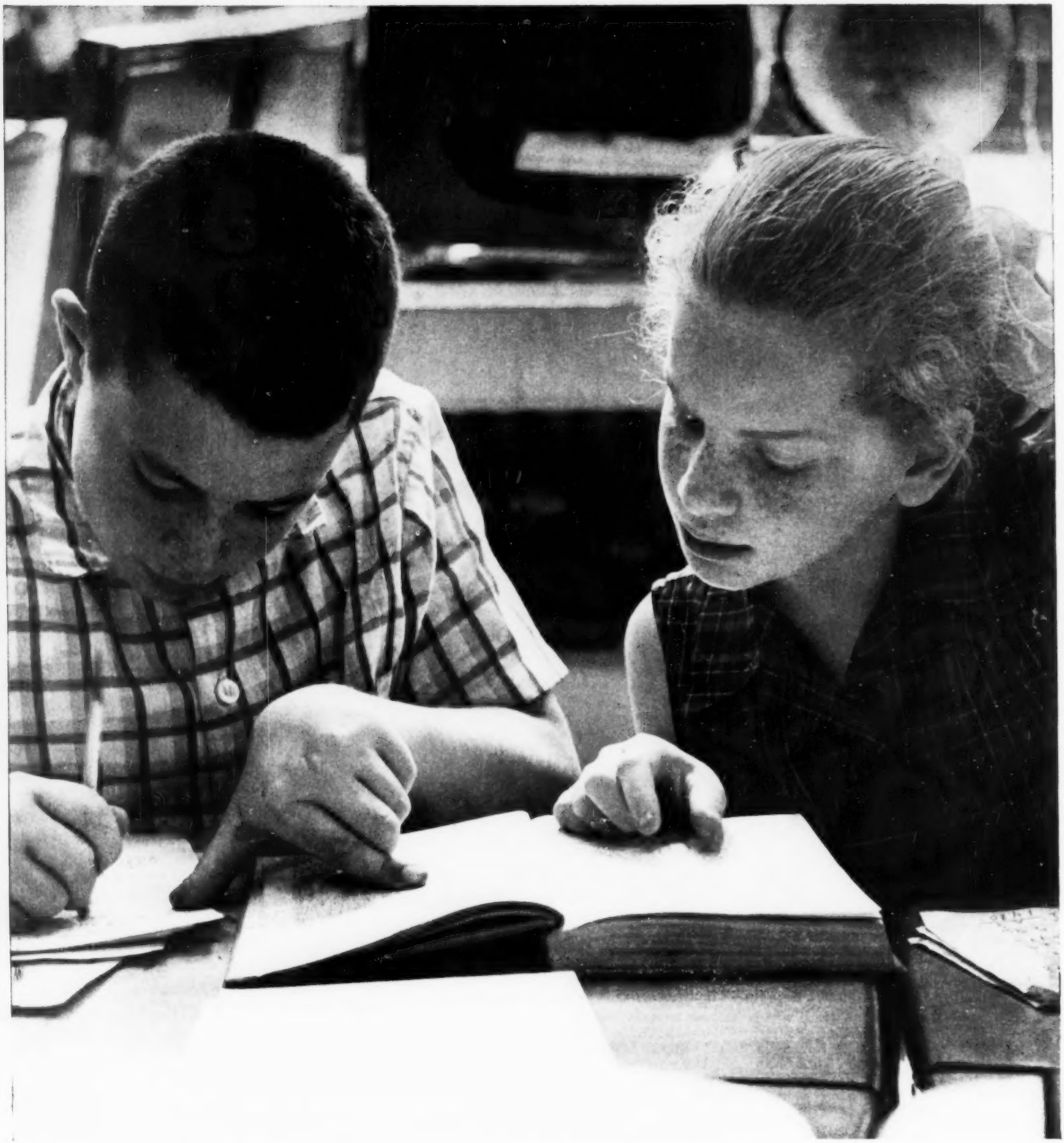
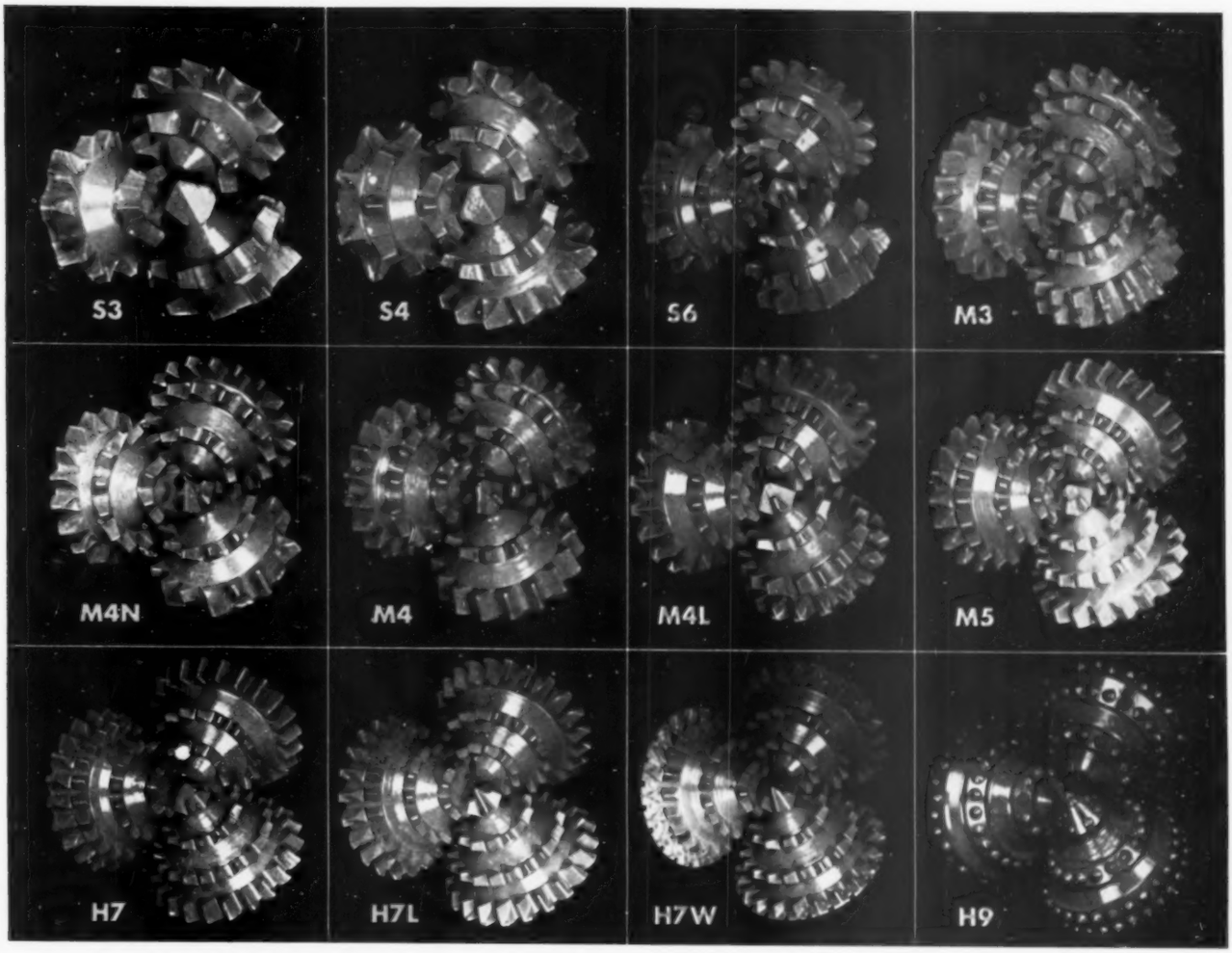


"Nowhere is the need for knowledge about business more important than among America's young people . . . It is striking that they know so little through their formal education about the economic system which enabled them to go to school, in which most of them will work, and through which all of them will be supported at their graduation." —M. J. Rathbone, President

Esso

Standard Oil Company (New Jersey)
and affiliated companies



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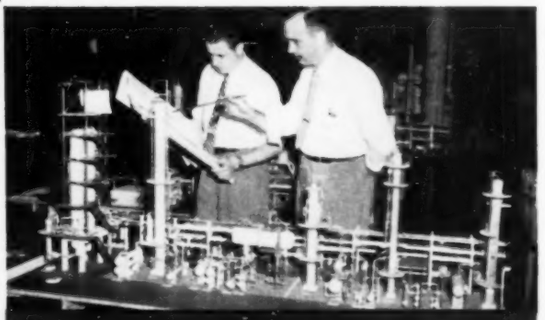
...and cordially invites you to see two of its advanced engineering and design techniques in actual operation— both at the New York Coliseum, June 1-5, and at M. W. Kellogg's New York headquarters, May 25—June 5...

WHEN IN NEW YORK for the Congress, refiners interested in advanced engineering and design techniques should plan to see the practical demonstrations of Kellogg's computer-programming and model-building developments. Both can be seen at Kellogg's exhibit at the Coliseum, Booth 510 (second floor, center aisle) or at Kellogg's New York offices.

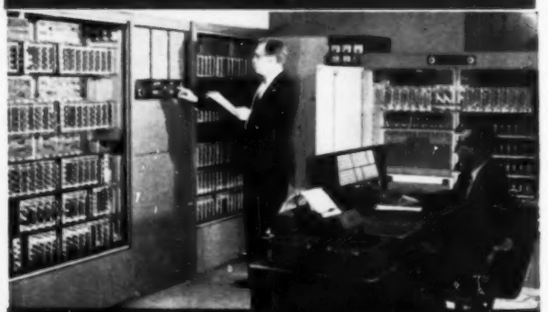
At the Coliseum, a Burroughs 205 Computer will run three Kellogg programs: (1) Designing a heat exchanger; (2) Computing material balances around a complete gas recovery system; and (3) Calculating streams for the cascade reactor of a Kellogg sulfuric acid alkylation unit.

Also at Booth 510, visitors may watch designers building scale models, see how model photographs are used in place of drawings, and become acquainted with the many ways in which models improve and speed designs.

Refiners wishing to pursue these two techniques further, or to learn about other Kellogg engineering practices, are invited to visit the company's New York headquarters, May 25 to June 5. Arrangements can be made at Kellogg's exhibit or by telephoning Mr. A. L. Dowling, Public Relations, at OX 7-5200.



See scale models being built



See electronic computers at work

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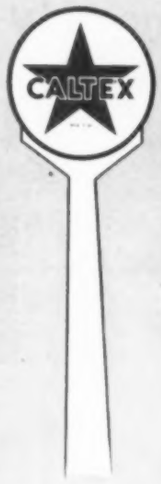

So that Caltex can be of even greater service to European tourists than it has been in the past, Caltex has made available a 42-page, fully illustrated, vest pocket size booklet, "Driving Abroad."

This booklet describes how to prepare for a trip in European countries and what to take along. It provides considerable driving and road information. It also contains many valuable charts and conversion tables.

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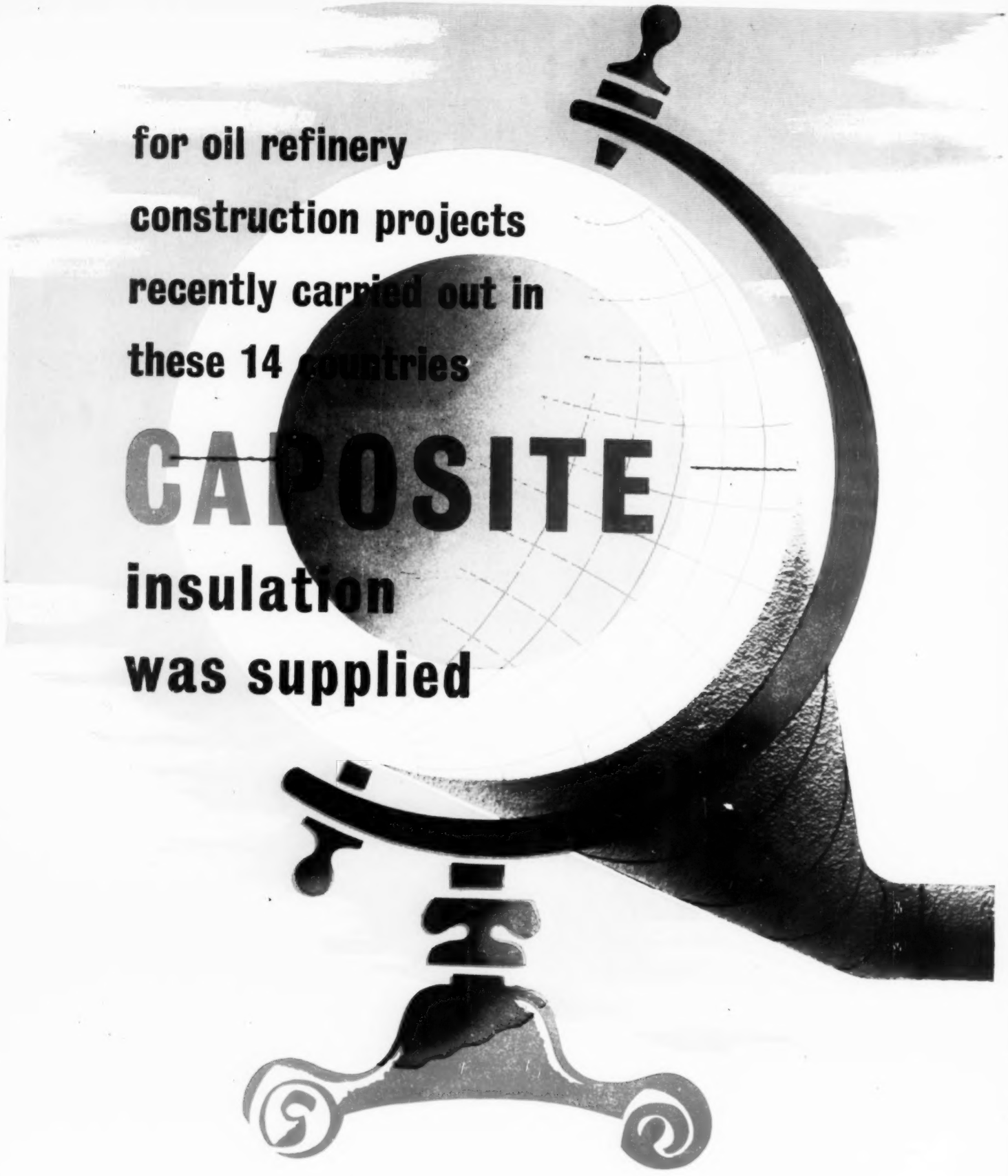
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CANADA *at Clarkson, Ontario*
for British American Oil Co. Ltd. Main Contractor: The Lummus Co.

COLOMBIA *at Cartagena*
for International Petroleum Co. Ltd. Main Contractor: Bechtel Corporation (Insulation Contractor: Harold Aber & Co.)

ECUADOR *at La Libertad*
for the Anglo-Ecuadorian Oil Co. Ltd. Main Contractor: Procon (G. B.) Ltd.

ENGLAND *at Kent Oil Refinery*
for The British Petroleum Co. Ltd.

FRANCE *at Raffinerie de Normandie*
for Compagnie Francais de Raffinage. Main Contractors: Kellogg International Corporation and Foster Wheeler Ltd. (France). (Insulation Contractor: Soc. Technisol)

IRAQ *at Daura, near Baghdad*
for Iraq Government Oil Refinery Administration. Main Contractor: Foster Wheeler Ltd. (London)

ITALY *at Genoa*
for Raffineria Dottore E. Garrone. Main Contractor: C. T. I. P.

KUWAIT *at Akmadi*
for the Kuwait Oil Co. Ltd. Main Contractor: Bechtel-Wimpey and E. B. Badger & Sons Ltd.

THE NETHERLANDS *at Pernis*
for N. V. de Bataafsche Petroleum Maatschappij.

NETHERLANDS ANTILLES *at C.P.I.M. Refinery, Curacao*
for Royal Dutch-Shell Group.

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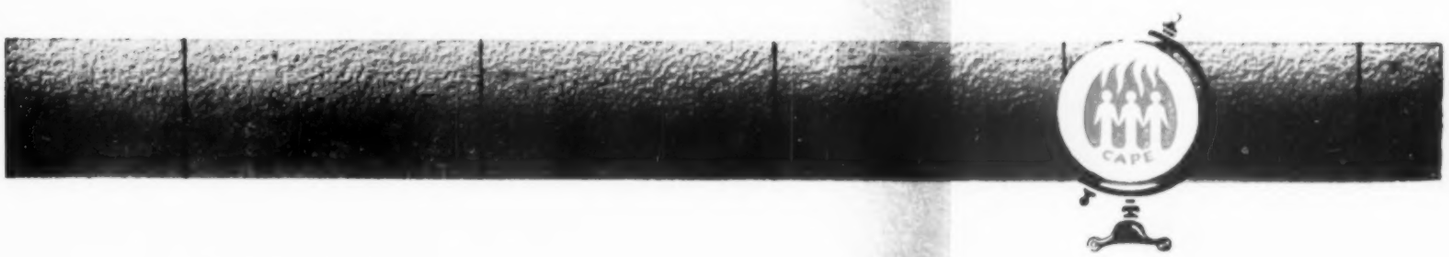

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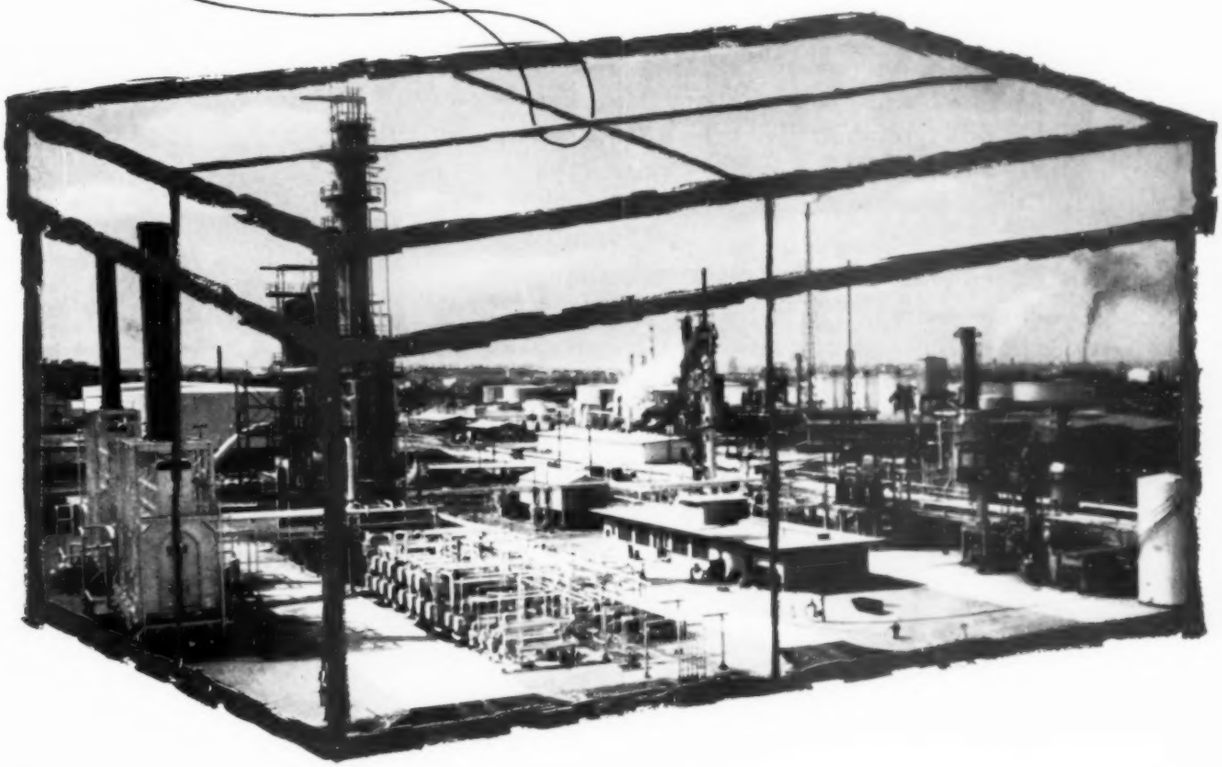

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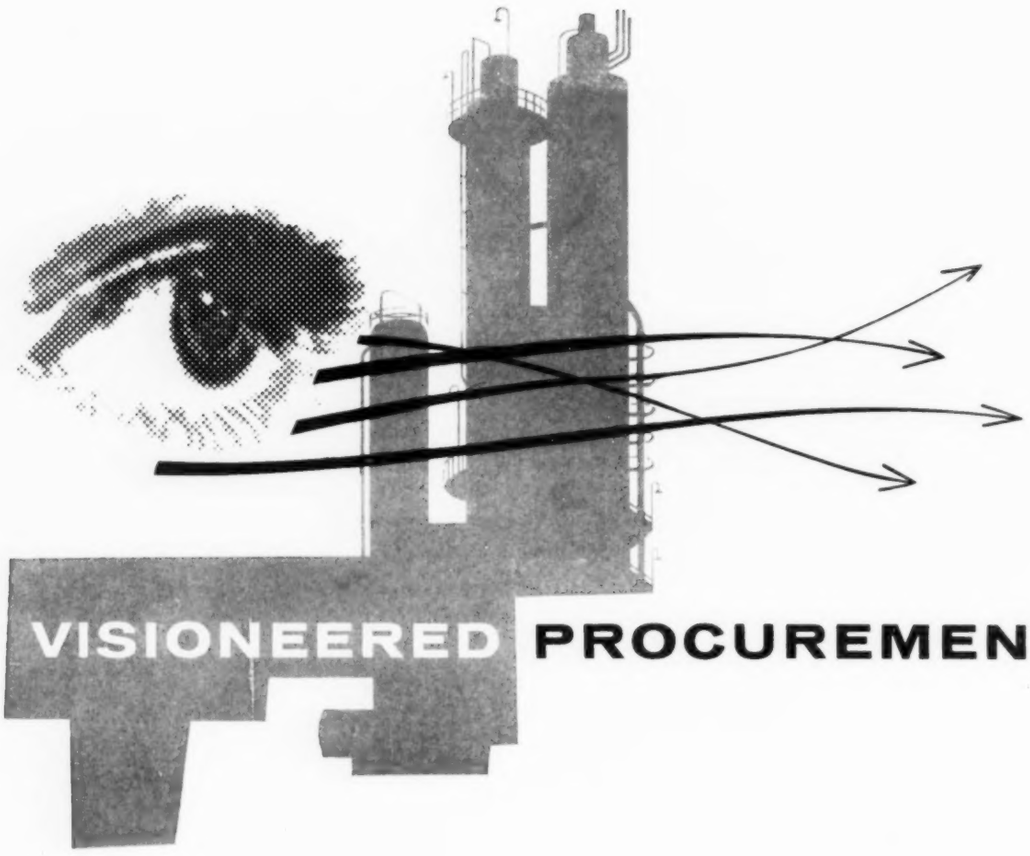

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First, it distills the world's news into one condensed letter. In *five minutes* you get all the news on new oil laws and concession arrangements. *Second*, it is painstakingly accurate. Our staff works from a *world-wide collection of oil laws* and concession contracts, *translated in their original and verbatim text* and are *kept on file* in our New York office for use by subscribers.

What does it contain?

Since May, 1958, when this service was begun, it has covered . . .

In Argentina . . . the new oil contracts were reported on before any other source, using their *verbatim* texts. They have been translated, along with the new nationalization law there and YPF's new statutes, and are kept on file.

In Algeria . . . On December 1st a summary of the new Sahara Law (promulgated that same week) was published and translated . . .

In Spain . . . the Report translated and reported in detail the new Spanish law of December, 1958 that governs Spain's oil development *and* the Spanish Sahara . . .

In the Neutral Zone . . . published the new Japanese offshore contracts, had original text, available to subscribers, *one day* after it was signed.

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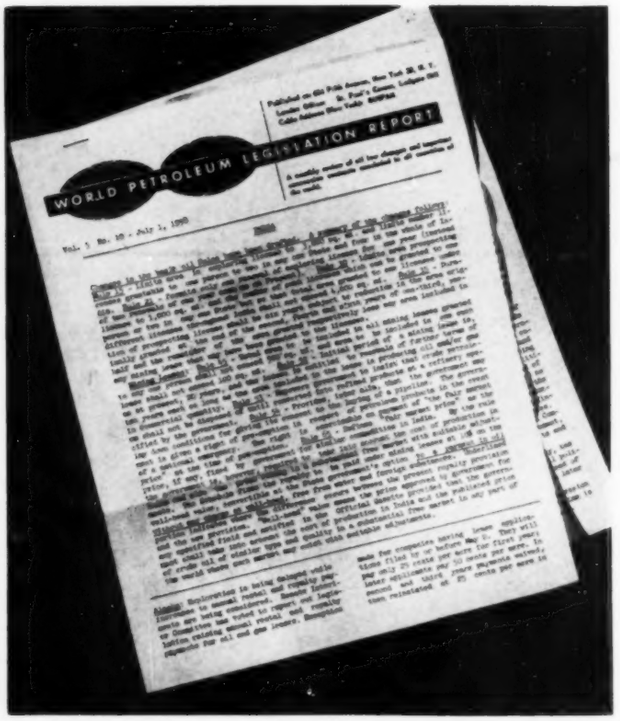
In Iran . . . published a resume of the Pan American contract before any other source did, and published the entire contract.



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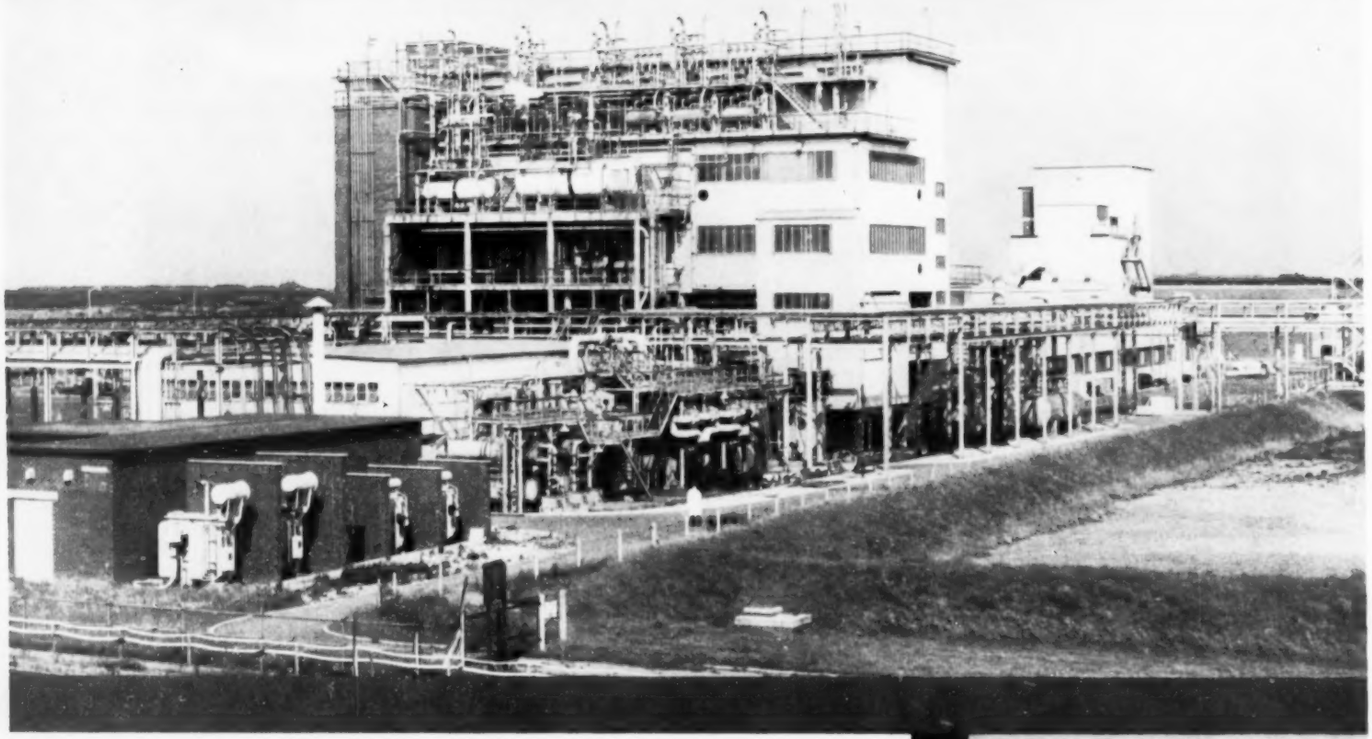

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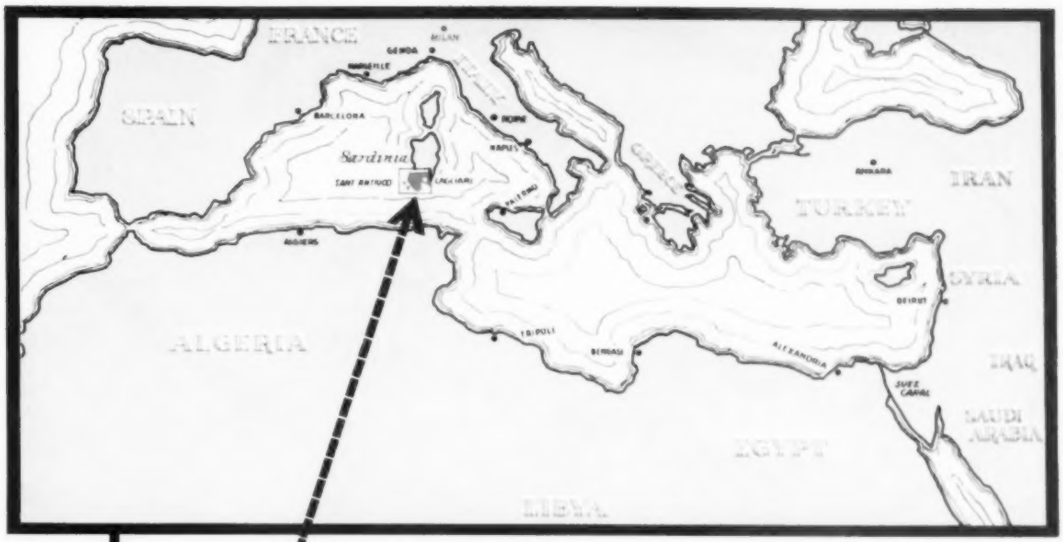

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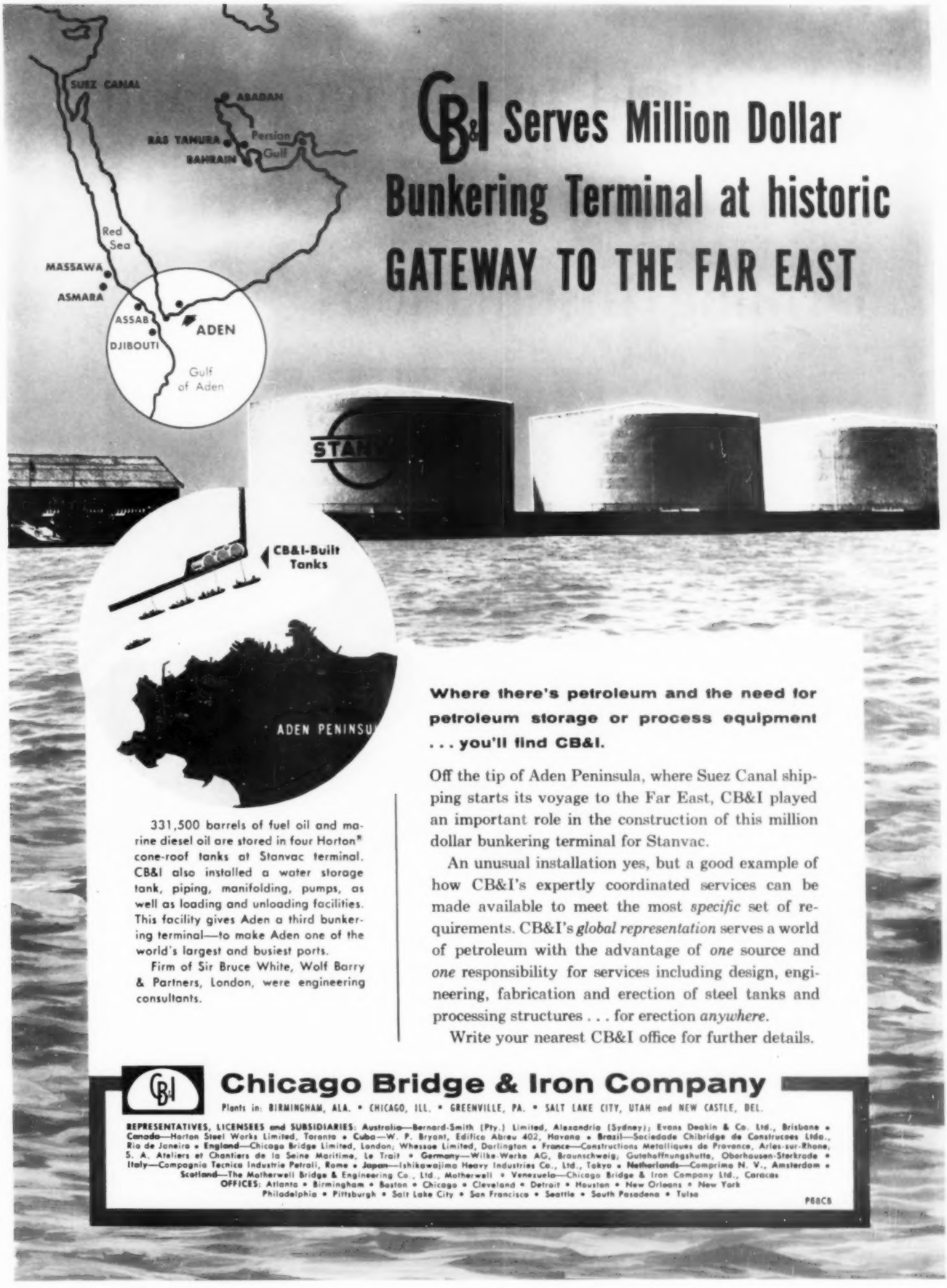

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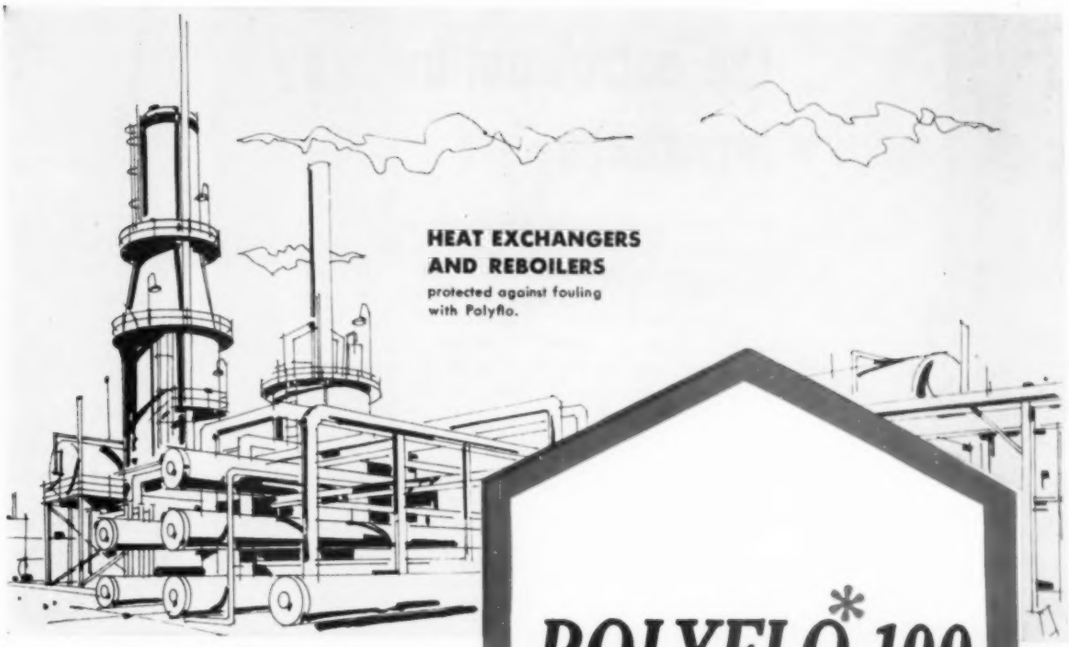

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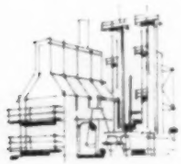

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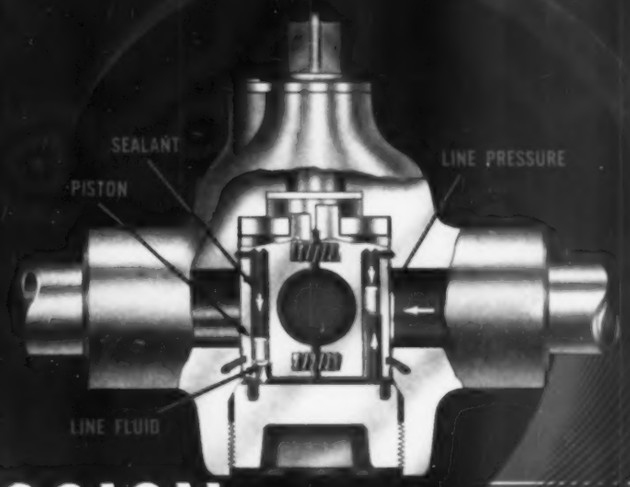

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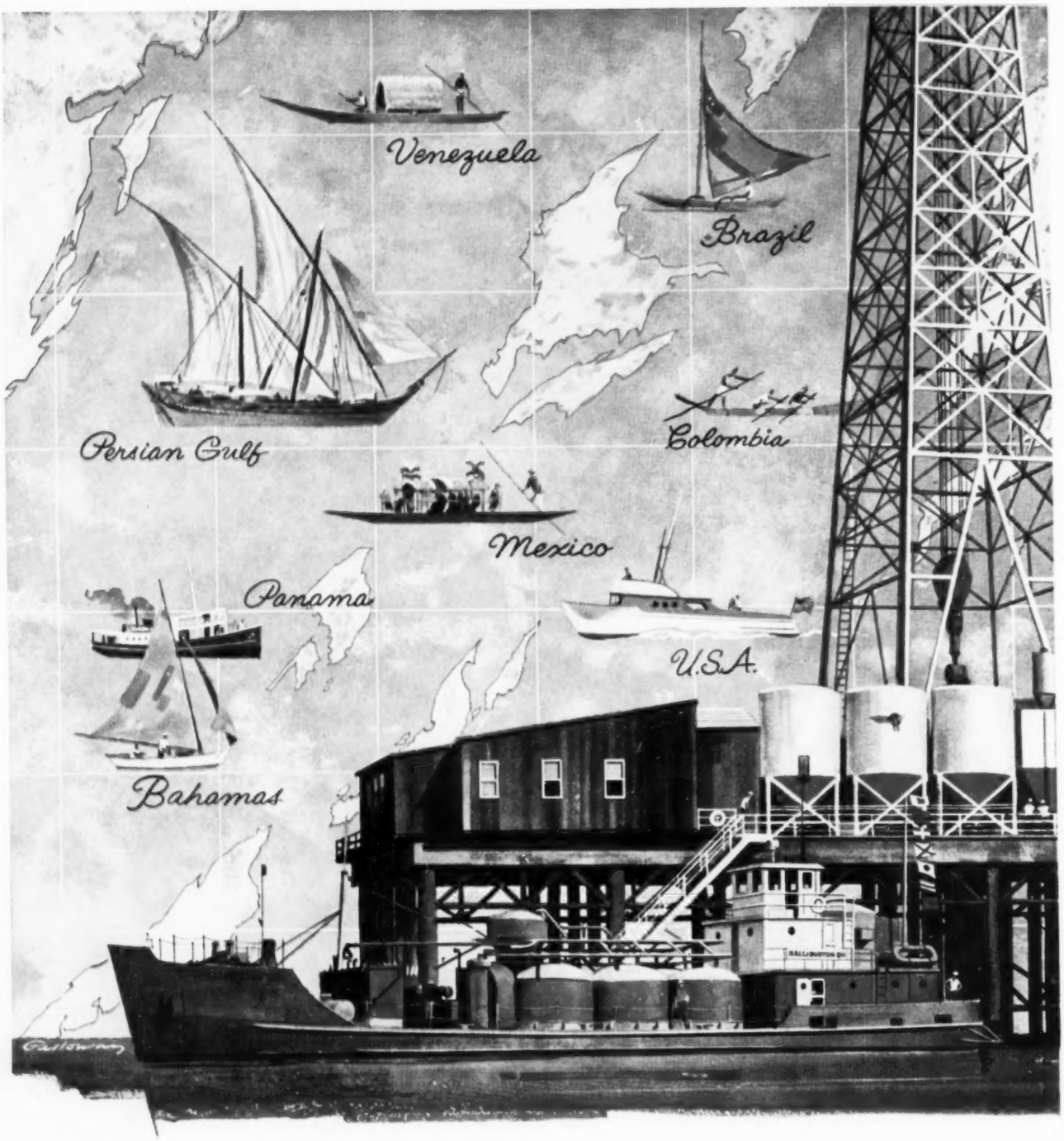

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For nearly half of its century of life, the oil industry has operated under a national policy granting the producer a tax allowance for depletion. Early methods involved establishment of values as of March 1, 1913, or at time of discovery; but these were abandoned in favor of the percentage method which has been in force for the past 32 years.

Percentage depletion has been the subject of congressional attack a good many times since it first was adopted. Each time the policy has stood up under searching examination by hostile lawmakers. Not only have various sessions of Congress approved continuation of the policy, but they have found the present 27½% about right—neither high nor low.

The current drive in the 83rd Congress for a cut in the percentage or repeal finds a group of representatives from nonproducing states claiming that citizens of Texas, Oklahoma, Louisiana, and other oil states are being favored at the expense of their less fortunate neighbors. The allowance is being held up as a loophole in the tax laws.

It now becomes an essential task for the industry as a whole to give northern and eastern representatives in Congress a briefing on why oil-depletion allowances are somewhat larger than those granted operators of coal mines and gravel pits. They must be shown the economic consequences of cutting or killing the allowance.

USA producers are at a competitive disadvantage in world markets today. After 100 years of hunting for oil, producers have developed many of the shallow, easily found deposits. New discoveries now require more diligent search and deeper drilling. Costs of finding and lifting oil are higher because of scarcity and depth, and because of the inflationary spiral. Meanwhile, oil is being produced more cheaply and in large quantities in other parts of the world. The USA has lost its former export markets, and now finds it difficult to retain its domestic business in the face of foreign competition.

Domestic producers would be at a greater disadvantage than they are today if the percentage depletion allowance were reduced. Costs of finding and lifting oil would rise; and, since the present financial return is not highly remunerative, it is clear that wildcat drilling would tend to decline.

A Saudi Arab operator adjusts bleeder on high and low pressure scraper at Aramco's Dhahran stabilizer. (photo courtesy Aramco).

Pressures for change in Middle East oil arrangements

by Dillard Spriggs

Fundamental changes are contemplated in the concession agreements which are the very bedrock of the Middle East's oil industry. Oil-industry and government leaders must fully appreciate each others' position and the consequences of their actions. Their goal is the same: a healthy and expanding oil industry with benefit to all.

THE legal and financial arrangements governing the operations of the oil industry in the Middle East are the object of growing governmental pressures for revision. These pressures, which originate mainly within some of the oil-producing countries, reflect a desire in these countries for higher revenues, or an expanded participation in various segments of the industry, or a greater responsibility in management decisions, or a combination of all three. At the same time, the management of the companies which produce oil in the Middle East are confronted with demands from their stockholders for increased revenues and dividends. The ways in which this conflict of apparently opposing interests is resolved is of great importance to the future development of the Middle East oil industry.

Middle East Aims—Expressions of Middle Eastern desires for change in existing producing arrangements are evident in the new concession agreements which were completed during 1957-1958. In Iran, agreements signed by the National Iranian Oil Co. with the Italian state oil agency ENI, Standard Oil of Indiana, and Sapphire Petroleum provide one example. In these cases, the government has assumed a full or co-equal partnership with the foreign entreprenuer (who will provide the initial cash outlays) and will participate in management decisions on an equal basis. Such an arrangement would enable the host government to acquire additional know-how in the operation of an oil-producing venture.

The agreement which the Sheikhdom of Kuwait reached with Japanese investors for exploratory rights to Kuwait's interest in the off-shore properties of the Kuwait-Saudi Arabian Neutral Zone is a symptom of the aim for higher profit-sharing. The agreement calls for a 57-43 split of profits earned on the venture rather than the conventional 50-50 division.

The agreement which the Kingdom of Saudi Arabia reached with the same Japanese group over its interest in these offshore properties offers an example of an even more far-reaching aim. This agreement provides that the tax on profits (56%) will be levied on the earnings not only gained from production but also on revenues from all other phases of operations—transportation, refining, and marketing.

The one major oil-producing country in the Middle East which has not negotiated any new agreements has obviously followed developments in neighboring countries with attention. It has asked that some of the acreage held by the concession holding company operating in Iraq be released. The desire to cede such acreage to other concessionaires on terms corresponding, in some respects at least, with those already negotiated elsewhere seems plain.

Other evidence of Middle Eastern pressure for change has been published in the press in that area as well as in Europe and the United States. The most outspoken of leading government representatives has been Sheikh Abdullah Tariki, the director of petroleum affairs in Saudi Arabia. In several public statements, he has emphasized that all future concession contracts should incorporate the following principles: (1) 60% of profits for Saudi Arabia; (2) application of the tax to integrated operations, not just to crude oil production; (3) the right of the government to supervise production and marketing operations. Tariki has also stressed the desire to have

Dillard Spriggs has specialized in international oil problems for a number of years. He is associated with Baker, Weeks & Co., New York investment firm.

large members of Saudi Arabia nationals learn all phases of the oil business.

So far as policy toward the existing concessionaires in Saudi Arabia is concerned, Tariki has said, "We shall continue to respect and protect the legitimate rights of foreign capital with the experience it provides." At the same time, in response to a question put to him during an interview with the Cairo weekly newspaper *Rose el-Youssef* (January 19, 1959) on whether he thought the Middle East Government's current share of oil profits is fair, Taniki said, "The equitability of any formula for the division of profits between a producing country and a concessionaire company depends on the time, place and prevailing circumstances. The early concessions did not give the Governments more than one eighth of the total profits of the oil companies. However, the government's share increased to 50% and, most recently, to more than 50%. Let me give you an idea of what is the income of Middle East producing countries from oil. The average income of each Government ranges between $0.80 and $0.82 per barrel exported. This represents the Government's total share comprising royalties, rent, and income tax. Some European countries, on the other hand, impose a tax of between $3.50 and $4.50 on each imported barrel marketed in its territory. And of course the oil companies themselves receive their share of $0.80-$0.82 per barrel in accordance with the 50-50 principle."

In addition to the allegation that some European countries exact taxes of $3.50-4.50 per barrel on marketing operations, some Saudi Arabian officials have indicated that the government's share of profits should be as much as $1.60 per barrel higher than it is. Such a calculation represents their estimate of the division of the profits they would be entitled to if the profit-sharing arrangements were based on integrated operations outside Saudi Arabia instead of producing operations within Saudi Arabi. For example, the alternate representative of Saudi Arabi to the United Nations, Omar Kamil Haliq, has said "On each refined barrel of crude oil there is a minimum of $1.00 net profit. . . . It is concluded that there is at least 50¢ of profit on refining rightfully belonging to the host government under the principle of 50-50 partnership. . . . The net profit on tankers and pipelines is conservatively estimated to be some 20¢, half of which should be credited to the host government, but is not. There is also the assumed figure of $2.00 net profit on the marketing of refined oil and its finished products, once it passes the refinery outlet to gas stations, half of which ($1.00) is also not credited to the host governments by the foreign oil concessionaires. Based on such estimates, the Arab oil experts conclude that even under the presently contracted 50-50 principle of profit sharing, the Arab share should rightfully be almost three-fold what it is now."

Such estimates are not believed by the companies engaged in the business of production, transportation, refining and marketing of Middle East oil to be representative of their operations at all. They point out they do not even include income tax, which would reduce the estimates by 50% (more or less) right away. Also in the past, the refining and distribution of oil products has not been a very profitable business. Gross refining margins in western Europe have been depressed during the past year just as they have been in the United States. Even in more prosperous years than in 1958 calculations can indicate that net profits earned from worldwide integrated operations by representative international oil companies have amounted to less than $1.00 per barrel of crude oil produced.

The practical difficulty of attempting to analyze an account separately for the profits earned on integrated operations from crude oil produced in one country from another country is a major one. Indeed, it would constitute a significant obstacle to any practicable formulation of profit-sharing arrangements over integrated activities of oil companies. But in the view of the companies concerned, such an extension of taxation beyond the boundaries of the producing countries is without any justification. Even if it were, the revenues which producing countries could realize would be minimal because profits beyond the producing stage of oil operations are limited.

The growing desire for greater benefits and participation in the oil industry evident in the foregoing examples is generally believed to originate in the current of nationalism that has swept across the Arab Middle East during recent years. This surge has frequently released strong, pent-up feelings against foreigners. Even where it has not, the essential thrust of nationalism is in the direction of change and modification of existing political and economic relationships. The drives whch nationalism unleashes need not surprise; if anything, they are commonplace for history is replete with their examples.

Frequently, however, the forces of nationalism are ill-understood by outsiders. Moreover, the business of oil companies is not normally deemed to include studying and understanding these forces. But it now appears almost imperative for oil firms to do something just like that.

Past Growth of Middle East Oil—At the same time, the proponents of change in the Middle East would probably be well-advised to view their demands in the perspective of present and developing oil market conditions in the Middle East and the world at large. First of all, the business of producing and refining Middle East oil has been expanded very greatly during the past ten years. Crude oil production, for example, has increased from only 700,000 b/d in 1946 to its present level in excess of 4,000,000 b/d. The revenues granted for Middle East treasuries by the oil business have risen from about $100 million to more than $1 billion. Additionally, the industry has provided substantial employment for local nationals not only directly but in ancillary industries and helped to improve general health and living standards. Perhaps most important, the large taxes paid to governments have made possible broad, ambitious programs for economic development which could not otherwise take place.

Growing Competition for Investment—Middle Eastern desires for change must also take account of basic changes that appear to be taking place in the world's oil reserve position. While it is, of course, true that the world's largest accumulation of oil reserves is in the Middle East, it does not have a monopoly on oil reserves. Very prolific reserves have been established in Venezuela recently; per well recoveries on new oil concessions in Lake Maracaibo compare very well with those in many fields in the Middle East. A major concentration of new reserves also appears to have been found in Indonesia during recent years.

It is also significant that an entirely new oil and gas producing area is being established in the Sahara. The Hassi Messaoud field is estimated, at this time, to possess 3.5 billion barrels of reserves. A 24-inch pipeline which will provide capacity for the movement of 240,000 b/d, will be completed to the Mediterranean coast in October 1959. In the Edjele-Zarzaitine area it is now estimated that 1 billion barrels of reserves have been found. Another pipeline which will have an initial capacity of 150,000 b/d is expected to be completed to the Mediterranean in the fall of 1960.

Saharan oil is likely to provide powerful competition for Middle East oil in several markets in Western Europe—the principal outlet for Middle East crude. Most European oil-importing countries are interested in having access to as broadly a diversified group of competitive sources of oil supply as possible. The availability of substantial oil supplies in the Sahara is bound to be welcomed by these countries.

The expansion of oil-producing capacity in new foreign areas outside the Middle East provides a further example of a well established fact of the oil business, namely, that the location and development of oil reserves is a dynamic, ever-changing business. The world's oil reserve and supply position is constantly shifting. Investment decisions of oil companies must always take this consideration into account. It is almost axiomatic that legal and fiscal arrangements in existing or prospective oil—producing areas should also reflect this consideration. Otherwise, the requisite investment would not be made available.

In conclusion, it seems plain that the future development of the Middle East oil industry will depend in great part on the extent to which governmental representatives and company representatives can understand the motives and requirements of one another. If they can achieve this understanding, accommodations on both sides are likely to insure a steady and substantial growth of Middle East oil. If not, the future of Middle East is apt to be marred by conflicts and a deterioration of the atmosphere suitable for orderly expansion of the industry. END

Christian Dohm—oil man extraordinary

C. F. Dohm, President
Pan American International Oil Co.

"THE refreshing thing about New York is its lack of sentimentality," said Christian (Chris) Dohm, as he contemplated Manhattan's ever-changing skyline. "When a building doesn't serve its economic purpose any more, down with it and up with a new one." That quote accurately reflects his attitude towards many of the established concepts of the international oil industry. In the fabulous Persian Gulf, for example, he got choice acreage via an entirely new type of contract which badly bent (but didn't quite break) the cherished 50-50 concept. In Argentina, Pan American was first to break the barrier, and at present Dohm has an arrangement under negotiation in another country that will startle the industry more than anything he has done to date.

An extremely likeable and approachable person, Chris Dohm's actions, controversial as they may be, are effective. Since he took office at the beginning of 1958 Pan American has risen from a brand-new company with nothing but money to one with extensive holdings in Iran, Libya, Argentina, Italy (a joint venture), Algeria and Mozambique, to mention a few. Few persons have ever done so much for a company in the short space of one year as he has done for Pan American since taking office during February, 1958.

The attitude of Chris Dohm's competitors toward all this could be summed up in a single sentence, "He is raising hell with our operations but in his place I'd do exactly the same thing," is what most major company executives say privately. Faced with the problem of finding really major production for a company that has major resources (Standard of Indiana, Pan America's parent, is the fifth largest oil company in the world but is short on oil to supply its large refining capacity) Chris Dohm took the shortest path toward his objective and implanted himself in the Middle East, North Africa, and in Latin America. Was he right? Nobody knows yet, but the chances are that he was. The Persian Gulf acreage lies across the Persian Gulf from the world's largest offshore field, Safaniyah. The Libyan acreage lies in the center of North Africa's oil rush, currently the scene of one of the world's leading oil rushes. The Argentina contract showed Pan American doesn't waste time. Less than six months after the contract was signed the company had its first producing well—and had signed the world's largest single cash rig purchase for 10 complete rigs that are now busily grinding away.

What kind of a person is he to accomplish this in a single year? Part of the answer lies in a unique combination of field experience, educational background and executive experience. Only 45 now, Chris Dohm has extensive experience in the field, where he spent 12 years as a gelogist and executive for Standard Oil Co. (New Jersey) in the various Latin American countries, including Venezuela, Colombia, Cuba and Santo Domingo prior to World War II. He volunteered for the air corps in 1942 but due to his "advanced age" (29) was turned down and continued his oil finding activities throughout Central America and the West Indies. His educational background includes fulfillment of all requirements for his doctorate in petroleum geology at Louisiana State University and a Master of Science degree in the same field. In 1949 he became vice president of Conorada Petroleum Corp., formed by Continental Oil Co., The Ohio Oil Co. and Amerada Petroleum Corp., to explore the world outside the U.S. and Canada. In that job he absorbed the world's geology and legislative rules of the game—all of which he took with him in his head when he left to become president and a director of Pan American International Oil Co. on February 4, 1958 (after rising to the presidency of Conorada).

More essential to his success, however, is a fortunate combination of practicality and imagination. His practical side shows when someone proposes a new venture to him accompanied by that inevitable and tiresome statement: "You'll get your money back in just a few years." To this he invariably replies, "I've already *got* my money. I don't have to get it back, show me where I can *make* some." The combination of this practical side with an imaginative approach is what counts. None of his concepts are static, and none of the industry's concepts are sacred—as the Iranian arrangement showed very clearly.

END

Suez Canal traffic at record high

by J. Lichtblau

Under Egyptian management, the Canal is working smoothly, with 1959 approaching record transit levels.

IN 1958 Suez Canal traffic reached an all-time high, whether measured by number of ship transits, net tonnage of ships or total freight traffic. The same was also true of northbound oil traffic.

Of course, in comparing 1958 statistics with those of previous years one must keep in mind the fact that in both 1956 and 1957 Canal traffic was exceptionally low due to war damage which kept it at a complete standstill from November 1st, 1956 to April 10, 1957, with full-scale operations not resumed until late June 1957. However, Canal traffic was normal in the first half of 1956 and the second half of 1957. Thus, by combining these two halves in to a "composite" year, for comparative purposes, it is possible to measure last year's progress fairly accurately. The results show that the Canal's overall performance was at a higher level in 1958 than in either the composite year 1956/57 or the year 1955, the last full year in which the Canal was still under the management of the previous Suez Canal Co.

The importance of the 1958 traffic statistics lies not only in the fact that they set a new record. Even more significant is that this record occurred in the Canal's first full working year under Egyptian government control. The figures are thus eloquent evidence that the fears expressed widely in 1956 and 1957 that the complicated Canal traffic control and pilot system could not be operated without experienced West European personnel were quite unfounded. Under the very capable overall management of Col. Mahmond Younes, the Suez Canal Authority seems to carry on its function as owner-manager of the world's largest sea canal with as much skill and dispatch as its predecessor.

Petroleum traffic has fully participated in the overall growth in Canal shipments. In 1958, northbound oil shipments amounted to 94,400,000 tons (1,888,000 b/d) compared to 82,663,000 tons (1,653,260 b/d) in the 1956/57 composite year and 66,893,000 tons (1,330,860 b/d) in 1955. Thus, it has increased at a slightly faster rate than Free World oil consumption during the past three years. The bulk of the oil traffic continues to consist of crude oil. However, the annual rate of increase has persistently been much sharper for finished products shipment. These have more than doubled in the last three years while crude oil shipments have increased by only 52%. The reason for the sharper rise of finished products shipments lies largely in the expansion of existing refineries and the construction of new ones in the Middle East during the past several years. This trend can be expected to continue so that finished products shipments, which now account for about one eighth of all northbound oil traffic, are likely to keep increasing their share of total oil shipments for the next few years.

Among oil exporting countries the most important one continues to be Kuwait which accounts for nearly 55% of all northbound oil shipments. Conversely, Kuwait is nearly totally dependent on the Suez Canal as a transit route for its oil exports. Last year, virtually all of the Sheikdom's export used that route. The only other oil exporting country which ships the bulk of its oil exports via the Suez Canal is Quatar. Iran ships roughly half of its exports via the Canal (if shipments from the Aden refinery, which runs largely on Iranian crude, are included) while Saudi Arabia, Iraq and Bahrain ship each a quarter of less of their exports by this route.

Among areas of destination for Suez Canal oil shipments the most important is, of course, Western Europe which currently takes about 90% of the Canal's total northbound shipments. The continued importance of these shipments to Europe and North Africa is seen by the fact that they accounted last year for just over half of that area's total oil supplies from all sources. Within the area, they are of even greater importance to the United Kingdom, which received over two thirds of its total oil supplies via Suez last year, and to the six Common Market Countries where they accounted for about 60% of total oil requirements.

(*Continued on page 70*)

SUEZ CANAL OIL TRAFFIC— NORTHBOUND, 1958

I. Tanker Movements (thousand net tons)

		Change from Previous Year (in percent)
Loaded Tankers	52,054	15.5
Empty Tankers	1,076	73.0
Total Northbound	53,130	14.3

II. Products and Crude Shipments (thousand metric tons)

Crude Oil	84,092	12.7
Residual Fuel Oil	4,627	18.2
Other Products	5,681	38.2
Total	94,400	14.2

III. By Country of Origin (thousand metric tons)

Kuwait	50,985	14.0
Iran	16,590	39.4
Saudi Arabia	9,666	— 1.4
Iraq	5,286	25.6
Quatar	5,166	5.3
Bahrain	2,584	— 15.1
Aden	1,329	— 12.5
Other Arabian Ports	73	
Total Persian Gulf	91,679	14.4
Egypt	1,382*	184.9
East Indies	1,038	— 45.9
Ceylon	89	41.3
Others	212	161.7
	94,400	14.2

* Includes about 600,000 tons of internal Egyptian transshipments.

IV. By Country of Destination (thousand metric tons)

U.K.	24,307	13.2
France	15,955	10.2
Italy	13,114	17.8
Netherlands	13,206	41.7
Belgium	4,664	6.9
Sweden	2,542	15.9
Germany	1,898	— 9.1
Total Above Countries	75,685	16.4
U.S.A.	9,050	— 4.7
All Other Countries*	9,665*	18.9
	94,400	14.2

*Consisting of the following:

Spain and Canary Island	2,799
Portugal	1,193
Turkey	849
Egypt	623
Greece	610
Finland	360
Canada	946
Caribbean Ports	485
Unidentified	1,800
	9,665

Southbound Traffic, 1958

I. Tanker Movements (thousand net tons)

		Change from Previous Year (in percent)
Loaded Tankers	1,451	25.0
Empty Tankers	52,993	9.5
Total Southbound	54,444	14.3

II. Products and Crude Shipments (thousand metric tons)

Crude Oil	1,267	264
Products	1,108	— 1.4
	2,375	44.6

III. By Origin (thousand metric tons)

Soviet Bloc	1,933	53.3
Western Europe	193	38.8
Western Hemisphere	249	2.5
	2,375	44.6

IV. By Destination (thousand metric tons)

Egypt	1,663	122.9
Soviet Far East and China	264	— 52.1
Other Asia and East Africa	448	29.5
	2,375	44.6

Aerial view of typical gas-oil separator plant of Arabian American Oil Co. in Saudi Arabia: Separator traps are in right foreground, and control house is in left center in front of pump shed.

Remote control of a gas-oil separator plant

by James A. Conneran

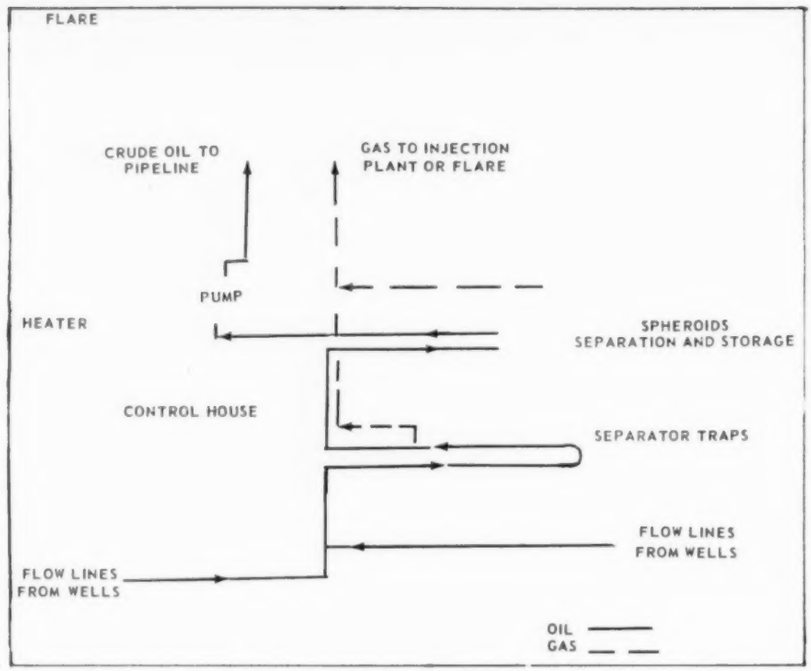
THE oil wells of the Arabian American Oil Co. in Saudi Arabia produces a crude oil mixed with a large volume of gas in solution under high pressure. The mixture of oil and gas from a number of wells is brought to a gas-oil separator plant (GOSP). Here, the fluid enters a series of horizontal vessels where the gas separates from the oil. The liquid level in each vessel or "trap" is controlled by a valve in the liquid bottom-outlet line, and the pressure is controlled by a valve in the gas-outlet line at the top of the vessel. The oil from the last stage of separation is pumped into the pipeline system for shipment to the Ras Tanura refinery or to be exported as crude. The gas from the high-pressure separation stage is piped to a gas-injection plant for pressure maintenance or used in an expansion turbine to drive the shipping pump. The low-pressure gas is burned as fuel or flared in the interest of safety. The pressures and levels at which "traps" operate are determined by equilibrium curves, flow rates, and gas requirements. As these requirements vary, the operators adjust the controllers' settings.

The conventional GOSP in Saudi Arabia is provided with a pneumatic control system which maintains the trap levels and pressures as well as the flow rate from the crude-oil shipping pumps to the pipeline. These plants are attended by a 2- or 3-man crew. This crew constantly watches the process operation, performs routine tasks on operating equipment, and maintains contact with the central dispatcher's office by radio. The operators log the process information and, at regular intervals, relay the data by radio to the dispatcher who records it on a master log sheet.

The extension of electrical power to some of the remote GOSP'S has made possible the replacement of gas-expansion turbines by electric motors for driving the shipping pumps. This has eliminated the need for a gas-fired heater which required operator attendance. This simplification of the plant operation reduced the operators' duties significantly, and further study showed that other duties could be eliminated by altering the instrument air and water systems.

An "automation" project now in the design stage will provide for unattended operation of one of these plants, with remote supervision from a base-station panel over

JAMES A. CONNERAN was born in Plainfield, N.J. He was graduated by Rutgers University in 1944 with a B.S. in mechanical engineering. Thereafter he was employed by American Cyanamid Co., E. I. duPont de Nemours & Co., and Chemical Construction Corp. in various engineering capacities. He joined Arabian American Oil Co. in 1955, and is now serving as instrument-section head in the New York engineering department.



20 miles away. The daily visit of a day crew will provide for routine tasks such as cleanup, chart changing, and well tests.

This type of operation is made feasible by the revision of the local control system, additional interlocks and alarm devices, and a remote-control and telemetering system. The total cost of this additional equipment and its installation represents an investment of over $200,000.

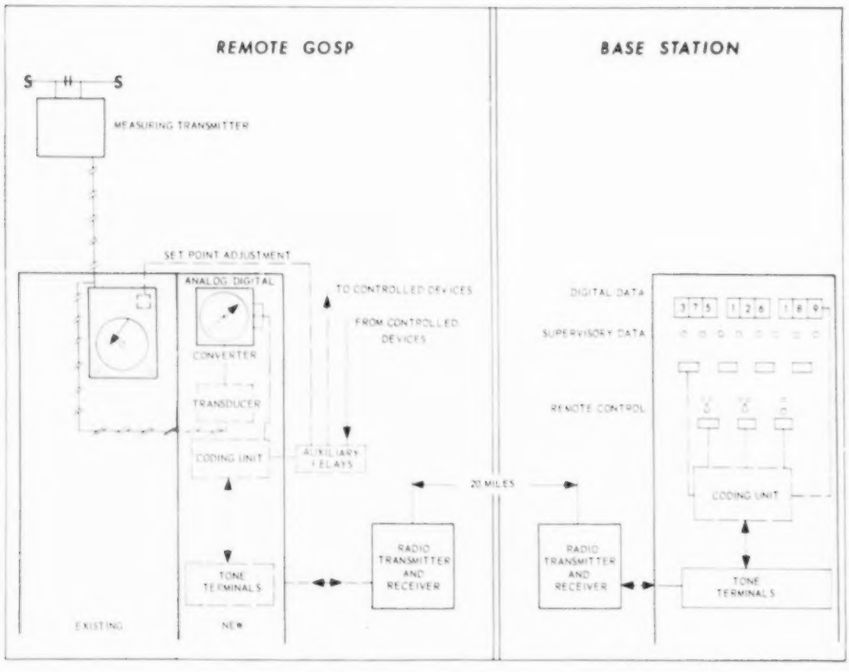
The pneumatic controls will be provided with automatic adjustment of set-point values to insure optimum conditions for various plant throughputs. A number of new devices will detect unsafe conditions, and shut down the plant.

The remote-control system will allow the operator at an existing central plant to monitor the plant operation. The system will allow him to raise or lower the plant throughput and provide him with sufficient supervisory information of the plant conditions. Although the plant will be started only manually, it may be shut down remotely by the base-station operator if the supervisory information indicates the necessity to do so.

The system will be of the pulse-code digital type operating between the remote GOSP and base station by means of duplex radio equipment in the 450-mc band. Most of the intelligence transmitted will be supervisory, such as that indicating the position of shutoff valves or certain alarm conditions.

A limited amount of information will be sent as numerical values, such as plant pressures and oil-output flow rates. These values will be measured as analog values at the plant, converted to digital readings, and sent as a pulse-coded signal.

The basic concept is that the plant will be a self-contained locally controlled plant, with the necessary interlocks and safety controls to shut it down if necessary to avoid dangerous conditions. The remote-control and telemetering system will be provided as an additional safeguard to anticipate unsafe conditions, and prevent unnecessary shutdown. In addition, the alarms groupings will allow the base operator to identify the source of trouble and dispatch the proper personnel for maintenance.



The conventional GOSP is built at a cost of about $1,500,000. The additional $200,000 investment required to convert one of these plants to remote control is justified in several ways. By integrating the base-station operation into the control room of an existing facility, the investment will pay out in several years. Although the remote-control equipment involves additional maintenance functions, the substantial saving in operating costs results in a net saving. Operating labor costs at a remotely located plant are high due to the high backup costs for services and housing facilities. The operator relieved of assignments at remote stations will be more profitably used at central plants.

The chief gain is a long-range one. This plant will serve as a model for the future remotely located plants which may be built without the expensive housing facilities and auxiliary services required with attended plants. A GOSP may be built for unattended operation at about the same cost as a conventional GOSP. In other words, the additional investment for remote-control equipment and necessary accessories is offset by the savings in eliminating housing facilities and auxiliary services.

END

Fig. 2

Petroleum technology in the USSR

Despite poor management and "back-up" facilities. Russia's oil industry will probably raise production to almost 5,000,000 bbls per day by 1965.

by Ivan S. Salnikov

THE Soviet government has recently announced a plan to boost crude-oil production by 1965 to a rate of 4,800,000 b/d. During the same period, natural-gas output is scheduled to rise to a rate of 14.5 billion cubic feet daily. These targets in crude-oil production amount to an average increase of slightly over 14% per year for the seven-year period (1959-65). In the light of Russia's recent annual increases in production of 18.0% and 17.8% for the years 1955 and 1956, respectively, the rates do not appear to be unreasonable targets. By implication, these plans reflect the confidence of the Soviet government in the ability of its petroleum technology to double current output and to reach the rate which is approximately half of the United States' producibility at this time.

Since World War II, information on Russian technology has been scarce, but in the past few years the Soviet government has permitted export of some 250 technical and scientific publications. Among these are such journals on the petroleum industry as *Oil Workers; Oil Economy; Geology of Petroleum; Geophysics*, etc. These publications are giving us a clearer picture of the USSR industry and its accomplishments and a better understanding of Russian petroleum technology. Much of the Soviets' ability to attain the targets set for 1960 and beyond will depend on USSR technical accomplishments. Therefore, a review of Russian petroleum technology should certainly give us a better understanding of the Soviets' aims and efforts.

The geography of the Russian oil fields has changed greatly in the past 20 years. As shown in Fig. 1, in 1940, 86.4% of Russian production originated in the southern fields located on the northern and southern slopes of the Caucasus Mountains, while today 77% of production comes from newly discovered fields in the Ural-Volga region. The steady progress in petroleum production over the past few years in this new area has not been due to phenomenal discoveries like those in old Baku, but has been in the pattern of USA experience where production has been built up by a continuous exploration. The center of petro-

*Presented before the annual meeting of the Society of Petroleum Engineers of the AIME, and reproduced through the courtesy of *The Journal of Petroleum Technology*, official society publication.

IVAN S. SALNIKOV, chief petroleum engineer for Standard Oil Co. (New Jersey), was born in Russia. He attended schools in Russia and the United States, and was graduated by the Colorado School of Mines in 1925 with the degree of petroleum engineer. He was employed by The Carter Oil Co., subsidiary of Standard in Tulsa, Okla., from 1925 to 1944, when he transferred to the parent company in New York.

leum activity, which has left Baku and the Caspian Sea where development started more than 100 years ago, now lies some 800 miles directly east of Moscow. As we can see in Fig. 2, the new region is very large, roughly comparable in size to the combined areas of Kansas, Oklahoma, Louisiana, and Texas.

This change is an important milestone in the economy of the USSR. First, it has opened up a tremendously large prospective area for exploitation of oil and gas resources; and, second, it has, figuratively speaking, brought oil fields into the heart of the country. On the east side of this prolific oil area is the Ural region with its large mineral industrial plants, and to the west are the populated industrial centers of European Russia. In effect, this change has practically eliminated water transport of oil previously coming from Baku via the Caspian Sea and Volga-Baltic Canal system, and has made possible the construction of pipeline systems from oil fields to the populated industrial centers.

Technological developments which have contributed to the growth of the Russian petroleum industry center around drilling technology and in the application of new developments in production techniques. In both of these fields, there can be found similarities to, as well as differences from, USA practices. For instance, while 88% of Russian drilling is accomplished by turbodrilling technique, turbodrilling is finding difficulties in proving itself competitive with rotary drilling in the USA. USA oil technology is devised to protect ownership of oil properties, and to safeguard inherent rights of owners to develop their properties to suit their individual concepts, desires, and needs. In Russia, on the other hand, mineral rights belong to the State, and Russia's oil fields are handled as units or in the manner of unitized operations in the USA. Finally, the progress of the USA industry is always guided by supply-and-demand considerations, while in the USSR considerations of State dominate the industry's growth and objectives.

Best available Russian sources of information indicate that in 1957 the Soviet petroleum industry was assigned a drilling target of 10 million feet of development and 8,577,000 ft of exploratory drilling, or a total of 18,577,000 ft. On the basis of average rig performance, as reported in Soviet literature, the best guess is that the industry has operated approximately 230 rigs in development drilling and approximately 620 rigs in exploration drilling, or a total of approximately 850 rigs. Fig. 3 shows the footage drilled and number of drilling rigs in the USSR in 1950 and from 1955-57. It has been officially reported that, in 10 months of 1957, exploitation rigs drilled an average 3,180 ft per rig per month, or some 420 ft less than the target rate of 3,600 ft per rig per month. Exploration rigs during the same period performed better in meeting their target rates, drilling 1,125 ft per rig per month vs. an assigned rate of 1,148 ft per rig per month. These sources indicate a continuous but not spectacular increase in efficiency of their drilling rigs. Their performance is graphically illustrated in Fig. 4 for the years 1951 through 1957. Drilling prowess of Russian turbodrills has been highly touted in the world press; yet an examination of Russian rig performance shows that Russian progress in drilling, over the past 10 years, has been behind the USA industry. Reports also indicate that the Soviet oil industry drills only a few deep wells, something in the order of 20 to 30 wells annually. But the average depth of wells drilled has been steadily increasing from 3,100 ft in 1940 to 4,800 ft in 1956.

Until only a few years ago, Russian rigs used 10-in. turbines and 12-in. bits almost exclusively. In the past four or five years, a number of 8-in. and 11-in. bits have been tested with smaller-size turbodrills in different areas. In soft and medium-hard drilling, these small units have proved very successful, and there are strong indications that, in the future, these sizes will be adopted in preference to the larger ones currently in use. For instance, it is being reported that, in one of the areas of the Ural-Volga region, 8-in. bits drilled at the rate of over 6,000 ft per rig per month, and it was predicted that within 1½ to 2 years all drilling in this region would be done with smaller bits. It has also been estimated that, with portable rigs and 8-in. bits, the cost of wells can be reduced by as much as 100,000 rubles per well. But the change to smaller bits and turbodrills is handicapped by a shortage of hard-formation bits as well as smaller turbodrill units and related repair parts.

Success with 8-in. turbodrills encouraged investigations into still smaller units. Experimental work with 5-in. turbodrills commenced in 1955 and, as of January 1, 1958, the Russians had drilled some eight wells to a depth of 4,600 ft with 5-in. turbodrills and 5⅞-in. bits. These small units also performed very well in test drilling of medium-hard and hard formations. The tests, however, indicated even lower footage per bit in comparison to larger units drilling in the same formations. On the basis of this performance with the quality of bits now available in the USSR, it has been concluded that this size unit has serious limitations below 5,800 ft in depth. Research on still smaller turbines is also progressing satisfactorily, and the reports indicate that the Soviets are now constructing 3⅜-in. 300-stage 1,100-rpm units for testing with diamond bits. These units are being designed for 4-in. bits.

In an effort to reduce drilling costs, the slim-hole technique has been given considerable attention, but nonavailability of small turbodrills and bits is acting as a block to wider use of this method. From records, one may conclude that only a limited number of wells was completed in Russia with 3-in. and 4-in. casing. Technical articles on this subject stress savings in steel, cement, mud, chemicals, etc. Furthermore, limitations of the turbodrill technique in deep drilling, because of low drilling rates at depths, are posing problems to the Soviet petroleum industry. In deep drilling, the bits do not stand up so well as in upper sections. In addition, there is a loss of turbine power.

Inspired mainly by these difficulties, and paralleling its experimental work to develop smaller-size turbodrills, the USSR industry is also experimenting with two types of electrodrills: a regular type in which the electric motor is a part of the drill stem, and a tubeless type or wire-line unit. The latter one is, in effect, a variety of Arutunoff's

Fig. 1

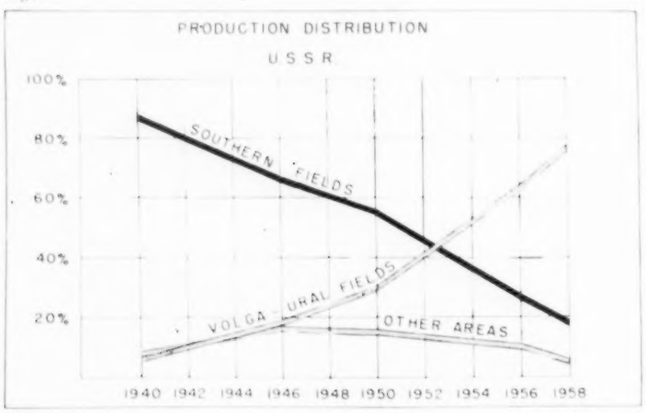
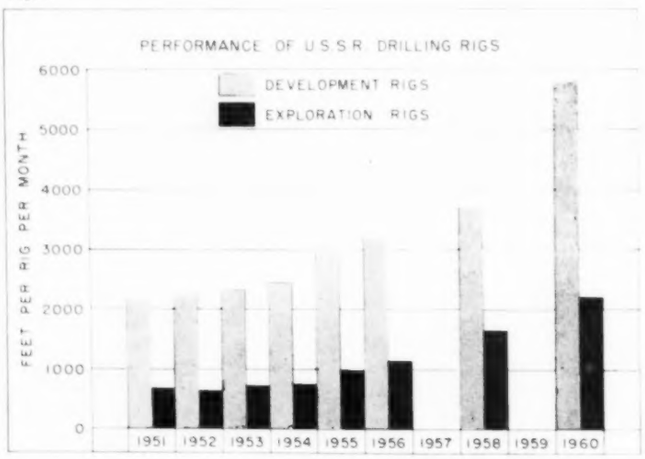


Fig. 4



electrodrill which has been widely tested in well-completion work and in coring operations in this country. One of the principal elements of the electrodrill unit is a drill pipe equipped to receive electric cable and electric-cable couplings. Unfortunately, Russian literature has not published detailed information on the design of the drill pipe and cable couplings. The second model was tested on 11 wells, and drilled a total of approximately 58,000 ft. The efficiency of this model is indicated by the following performance: drilling footage of 63 ft per bit; drilling rate on bottom of 290 ft per hour; and a commercial rate of drilling of 5,320 ft per rig per month. A most recent electrodrill model, a third model, is a 230-kw unit designed to rotate the bit at 680 rpm. On a most recent test of the last model, a rate of 6,600 ft per rig per month was attained.

In justifying research and development in electrodrilling, Russian engineers are stressing: maintenance of bit rotation, maintenance of control and weight, ease of control of drilling, lower drilling-mud circulation rates, less wear on drill pipe, use of heavy drilling muds, deeper drilling, drilling smaller holes, and better control of directional drilling.

A wire-line, or tubeless, electrodrill unit was run in a number of tests in the Ural-Volga region. This unit, equipped with the three-phase 500-volt 3,000-rpm motor, is housed in an 8-in. jacket and designed to drill with $9\frac{3}{4}$-in. bits. The hoisting cable is a copper-core wire line with an outside diameter of $1\frac{1}{4}$ in., with hoisting capacity of approximately 30 tons. Thus far, this unit is an experimental one, but the reports to date appear to indicate that the wire-line electrodrill may out-perform turbodrills in drilling below 5,000 ft. The Soviet engineers also are considering combination drilling, using the turbodrill for the first 5,000 ft, and the tubeless electrodrill for the rest of the hole.

USSR drilling research is also working on the development of a bitless drilling method. The Mining Institute of Moscow is experimenting with flame disintegration of rocks by a technique similar to that used in the Linde method now employed on the Mesabi range to drill blast holes in taconite. Another technique which is currently being studied in the USSR laboratories attempts to use power of electric discharge to create fluid shock waves for rock disintegration. The investigations which started in 1956 appear to indicate that electric discharges in liquids can drill cylindrical holes in sizes sufficient for oil-field application. Fifty-millimeter holes, for example, were drilled in 230-mm x 600-mm rock samples in 25 min to 30 min with a discharge frequency of 300 per min.

Another technique, which is currently being studied in the laboratory as well as in the field, makes use of small explosions in liquid media. This method, when used in drilling between 2,250-ft and 2,745-ft depths in extremely hard formations, showed a performance of 7 ft per hour vs. 0.5 ft per hour for bit drilling. In another instance, an interval of 311 ft was drilled on one run of an instrument into the well at 4,200 ft in depth.

The deepest well drilled in Russia to date has reached a depth of 13,389 ft. Russian reports appear to indicate that wells up to 7,000 ft can be drilled in one to two months; but that deeper drilling, from 7,000 ft down to 11,000 ft, requires from five to eight months. The same source states that drilling from 6,600 ft to 10,000 ft with 9-in. to 11-in. bits requires mud-pump units in sizes of 2,000-hp to 3,000 hp. The new large rigs which are now being manufactured in Russia are being equipped with 2,000-hp to 3,000-hp pumps designed to operate at pressures from 2,700 psi to 3,000 psi.

In summarizing, it may be concluded that Russian progress in drilling efficiency is a direct result of steady pressure to reduce drilling costs and the investments required in an expanding State economy. Perhaps the greatest effort was directed toward improving rig performance through use of turbodrills. This is well illustrated in Fig. 5, which shows an increase in use of the turbodrill from 40.3% of the wells in 1952 to 87.8% in 1956. However, a switch from the rotary to the turbodrill, good as it may appear on a statistical basis, is not resolving the basic Russian problem of unimpressive performance of Russian rigs. The basic difficulties in Russian drilling technology appear to center on too much reliance on the turbodrill technique and on a lack of good-quality drilling bits. Under the weights and speeds encountered in turbodrilling, drill bits simply do not stand up. Complaints of nonavailability of good-quality bits are often mentioned in Russian articles on drilling.

The USA industry experience with the Russian-made turbodrills using USA bits simply underscored the problem. Maintenance of the turbodrill also is a great source of complaint by drilling crews. The average working life of a turbodrill in Russia is 26 to 30 hours on bottom between overhauls, but the most important limitation of turbodrill technique is perhaps its inefficiency in deep drilling with the present quality of drill bits.

Russian technical literature frequently mentions the extremely long time consumed in drilling below 7,000 ft. To improve drilling efficiency at greater depth, a trend to smaller size of hole has been noted in Russia. The trend to smaller turbodrills is a move in the right direction, and could result in reduced drilling costs. Yet it also, like other remedial measures, has its limitations. Small bits to be used with small turbodrills have to be developed. The principal difficulty with large bits in turbodrilling is failure of bearings. It would appear that this difficulty with smaller bits will be even greater. Perhaps a better idea of the problems in Russian drilling technology can be had from the October 1958 "Recommendations of the Russian Conference on Drilling Technology." In summary, these were:

1. Reduce bit sizes to 8 in. and 9 in. in diameter, and subsequently to 6 in. Plan on 70% of drilling with small bits by 1965.

2. Expand application of electrodrill, particularly in drilling below 7,000 ft in depth and in areas where heavy viscous drilling muds are required to overcome drilling difficulties.

3. Continue efforts to improve design, quality, variety, and cost of new drilling bits.

4. Improve quality and design of drill pipe, and make available nonmagnetic drill collars for directional drilling.

5. Design and make available to the industry a variety of rigs for deeper drilling and portable units for well testing.

6. Make readily available aquagel, barytes, and chemical agents for all general drilling purposes. The availability of this material is needed to reduce time lost in fishing operations.

7. Reduce size of hole drilled and quantity of casing used in completion of oil wells.

8. Provide better management and planning in delivery of equipment and supplies and adaptation of new equipment and drilling technology.

The big problem in Russia appears to be the lack of overall backup facility to support a full-going drilling effort. Compared to our best rotary performance which can maintain over 50% of the time drilling on bottom, time analysis of Russian drilling shows only an average of 11%. Besides a high percentage of fishing, over 19%—attributed to poor materials and mud control—there is a very high service and idle time of over 40%. This is attributed to poor transportation, distant supply bases, and organizational delays compounded with poor management. *Briefly, Russia appears to have good technical backup, but lacks the integrated cooperation and industrial facility which backs up the USA industry.*

In the area of oil-production operations and exploitation of oil reservoirs, practices in Russia are similar to those used in the USA, with some differences. Since there are no problems of ownership of oil reserves and the related obligatory offset drilling, the problem of well spacing in production control is very small. The Russians have been reporting success in the use of contour water flooding, which may be defined as a pressure maintenance by down-structure injection into the surrounding aquifer. The accepted practice now in the Ural-Volga region is to apply water-injection operations before reservoir pressure drops below the optimum required for most efficient operation. With this practice in vogue, water-injection wells are drilled simultaneously with the drilling of development wells. The common practice is to drill production wells on a pattern of 1,200 ft to 3,000 ft apart, or a spacing density of 50 to 150 acres per well. Water-injection wells are initially spaced 3,000 ft apart and approximately 6,000 ft from the edge row of production wells. In addition, a number of control wells are drilled depending on the type of control and information required in operation of the particular reservoir. These control wells are

cased through the pay, but left unperforated. Oil-water fronts are traced by using isotopes in injected water.

In the Romashkinsky field of the Volga region, Russians are experimenting with a special type of pressure-maintenance operation in which water is injected simultaneously at the top of the structure and into the down-structure aquifer. In this technique, the production of the four rows of wells is assisted by water injection into a row of 1,500-ft-spaced water-injection wells drilled on top of the structure and into a ring of water-injection wells drilled at the periphery some 6,000 ft from the first row of production wells.

The magnitude of water-injection operations in Russia probably best can be illustrated by amounts of water injected by the industry. Since 1946 the water-injection rate has been raised from 44,000 b/d to approximately two million barrels per day in 1956. This represents an injection of slightly more than one barrel of water for each barrel of oil produced by the industry. It is also reported that in 1957 over 68% of all production in the USSR came from water-injection operations. This rate is estimated to rise to 82% by 1960. Russian publications would make it appear that all new Russian oil fields come under the general instructions to institute flooding as rapidly as possible, the objective being to increase production and to have oil wells flowing. As a result in 1956, for example, 64.3% of Russian oil production came from flowing wells.

In contrast to large-scale water-injection operations, evidently little gas is used for pressure maintenance. An occasional reference to gas-injection operations can be found in technical publications, and a recent article described use of air in pressure maintenance. A substantial quantity of natural gas is, however, being used in gas-lift operations as evidenced by the fact that approximately 5% of Russia's oil production is lifted by gas. No information is available concerning the progress being made in collection of oil-field gas, but waste is frequently mentioned in the newspapers, and more work may be under way than has been reported thus far. In 1956, for instance, 290 mmcf per day, or 45% of the total oil-field gas, was said to have been wasted.

To improve further the economics of oil-field production, Russian engineers are considering combining directional drilling with their contour water-injection technique. In this scheme, from two or four producing wells are to be drilled from one location on a contour line. It is claimed that, inasmuch as directional wells can be drilled as cheaply as the straight ones, the reductions in expenditures for roads, water lines, electric lines, a related producing facilities will be very substantial.

Russian technical publications say little of secondary-recovery operations. With the tremendous popularity of maintaining pressure by water injection, there must be a number of pattern water-flooding projects in operation in the older oil fields, but the reports give no details on such activities. However, official reports have mentioned that increased production from secondary-recovery projects is sufficiently large to offset a natural decline in production of the older areas. About a year ago, it was also reported that secondary-recovery methods were adding in the order of 45,000 b/d. Most of these secondary-recovery operations are located in the old Baku Grozny areas. Reports indicate, however, that experiments with thermal recovery methods, surface-active agents, condensed gas-drive techniques, and other processes have been made.

Other Russian production problems and objectives are in many respects similar to those in the USA. Russian oil-producing practices in corrosion control, prevention of oil losses, application of stimulation techniques, handling of paraffin problems, and use of suggestion systems to improve operations appear to be on a level with those found outside Russia. Discussions of these problems in Russian annual reports and industrial conferences indicate, perhaps, that more emphasis is being placed on improving efficiency of these practices. An item of possible interest in well-stimulation technology is a wider use of isotopes in fracturing media. Russian reports also appear to indicate a more successful use of heavy viscous crudes in fracturing and in well workover operations to shut off gas and water-bearing zones.

Another important development in Russia is an apparent all-out effort to introduce automation in the oil industry. In April 1958, an industrywide meeting on automation was held to kick off the drive. It was reported in this meeting that some 15,000 wells in Russia were using local automation, and that there were some 10 different telecommunication systems and numerous applications of automation in sampling, measuring, and dispatching of production. After exchange of information on automation, the conference recommended an all-industry study of automation by technical institutes, with suggestion that the study include all operations from wells to refinery.

It has been seen that the Russian petroleum industry, in spite of difficulties of its own making, achieved impressive progress in moving crude production activities from distant Baku into close proximity to the populated areas of Moscow and the industrial center of the Urals. The rapid development of this new oil province through application of the most modern production technology is also an achievement of no small magnitude.

The next point of interest, of course, is the rate of Russia's future progress in both oil production and petroleum technolgy. Looking ahead is, at best, a hazardous undertaking even at home, where economic forces have a free play. It becomes much more difficult when politics and State controls become interwoven with economic forces as in the State economy of the USSR. The best guess, however, is that odds are in favor of a better climate for the petroleum economy in Russia for the following reasons:

a. A concerted drive to reduce drilling and production costs.

b. Improved efficiency through automation.

c. Improved planning through decentralization.

(Continued on page 70)

Fig. 3

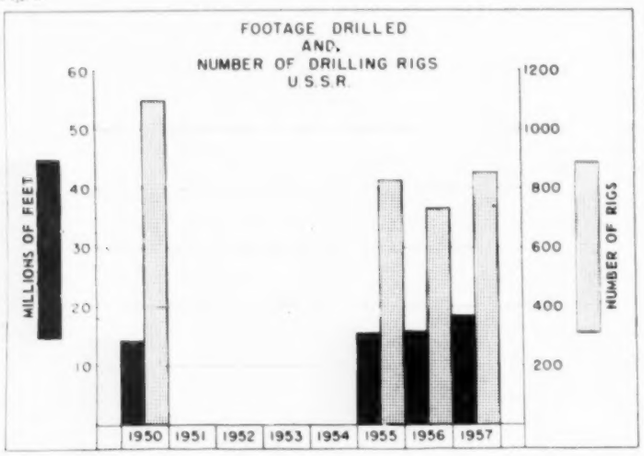
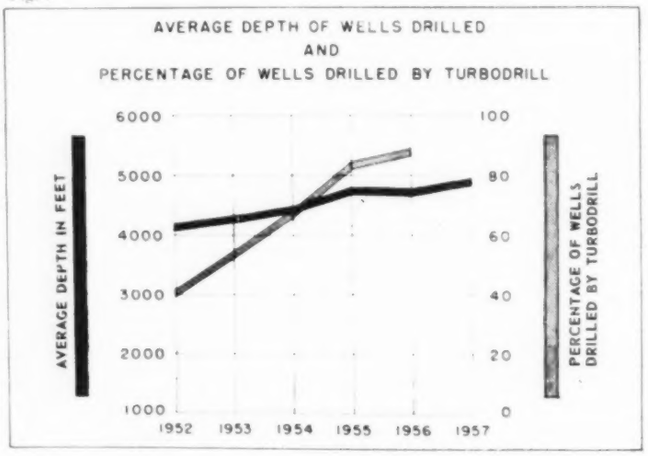


Fig. 5



Members are discussing plans for the Fifth World Petroleum Congress at the meeting of the Permanent Council in Brussels, January 1959. Shown, top row (left to right), are G. W. Duncan, assistant general secretary, Fifth World Petroleum Congress (USA); Professor C. Padovani (Italy); W. James (The Netherlands); J. A. Beukers (The Netherlands); Dr. I. H. Ter Meulen (The Netherlands); C. E. Davis, general secretary, Fifth World Petroleum Congress (USA); T. A. Salvadori (Italy); Professor G. Roberti (Italy); R. Navarre (France); Sir Stephen Gibson (Great Britain); Professor H. Weiss (France); Dr. E. B. Evans (Great Britain); Dr. G. W. Gurd (Canada).

Shown in bottom row (left to right) are Dr. Ing. Oscar Zaepke, secretary, German committee for the congress; Dr. H. Kupper (Austria); Dr. H. G. Waldschutz (Austria); J. K. Roberts, chairman, Program Coordination Committee, Fifth World Petroleum Congress (USA); D. A. Hough, general secretary, Permanent Council (Great Britain); E. V. Murphree, chairman, Permanent Council (USA); Professor E. P. Malschaert (Belgium); P. de Ryckere, secretary, Belgian committee for the congress; Professor P. V. Ch. Erculisse (Belgium); S. Scheer (France); H. B. Nichols (USA); Dr. Jerry McAfee (USA).

5th World Petroleum Congress plans

HEAVY advance registration for the Fifth World Petroleum Congress and Exposition opening in New York's Coliseum at the end of next month would seem to confirm expectations that there will be a record attendance of between 5,000 and 6,000 at the meeting, the congress secretariat reports. The exposition, occupying the first two floors of the Coliseum and showing the latest equipment available in the principal fields of petroleum activity, is expected to draw some 20,000.

Every effort is being made to provide adequate facilities for registration at the Coliseum to avoid unnecessary delays. For the convenience of early arrivals, the registration area on the third floor of the Coliseum will be in operation on the afternoon of Friday, May 29, and all day Saturday and Sunday, May 30 and 31. From then on, it will be open daily from 8:30 am to 5:30 pm.

"We hope everyone who can will take advantage of these arrangements and register over the weekend," says C. E. Davis, general secretary of the congress; "otherwise it will put a considerable strain on our registration facilities when the technical sessions start on Monday, June 1."

Mr. Davis adds that those who have registered by mail in advance should also avail themselves of this weekend opportunity to collect their congress badges, preprints, final programs, and the other documents they will require to participate in the meeting.

The opening session of the congress will be held in the Grand Ballroom of the Waldorf-Astoria on Sunday, May 31 at 3:00 pm. It will last approximately an hour, and will be followed by an informal reception. The technical program will open at 9:15 am the following day, and 100 technical sessions are scheduled during the week through Friday, June 5.

Out of a total of approximately 290 papers, about 35 will be in French. Each author will be allowed 20 minutes in which to present his paper in either of the two official congress languages, English or French. This presentation will be followed by a short prepared discussion by an authority on the subject of the paper, and then general floor discussion will be invited. The discussions, which must be in one or the other of the official languages, will be interpreted if requested by the audience.

In addition to the main technical sessions, three symposia, each lasting a day, are planned. These will be held in the Henry Hudson Hotel, opposite the Coliseum. The International Association of Sedimentology is conducting the first of these on Monday, June 1, under the chairmanship of André Vatan, of the Institut Français du Pétrole. The morning session will deal with Recent marine sediments, and the afternoon one with ancient sediments. The following day the viscosity-temperature relationships of lubricating oils and their practical significance will be discussed in a symposium arranged by the International Committee on Rheology, over which Professor H. Weiss, of Paris, will preside. The third symposium, on Wednesday, June 3, will deal with the chemical approaches to the recognition of petroleum source rocks. It will be under the chairmanship of M. Louis, of the Institut Français du Pétrole. This symposium is being organized by a committee formed as a result of a resolution adopted at the Third World Petroleum Congress at The Hague in 1951.

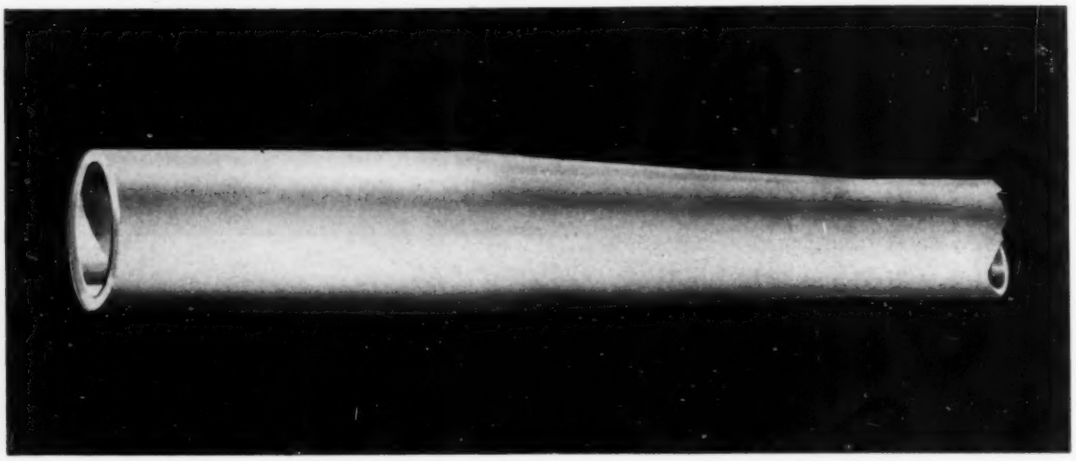
It was felt at that congress that there was a need for generally accepted definitions and simple methods of analyzing various kinds of organic matter occurring in geological formations. This was thought to be especially true in regard to crude oils in connection with migration studies and classification questions. The committee presented its first report at the Fourth World Petroleum Congress in Rome in 1955. It was then recommended that the committee should function as a connecting link and general information center on the progress of world research in this field. Additionally, it was recommended that the group should organize a symposium at the fifth congress on such progress. The committee has held three meetings since the Rome congress—London (1956), Hannover (1957), and Amsterdam (1958).

Following the congress' afternoon technical sessions, there will be general lectures the first four days of the meeting. These will be held in Carnegie Hall, and will start at 5:30 pm. L. F. McCollum, president of Continental Oil Co., will give the first of the lectures on Monday, June 1. He has chosen for his subject: "Oil's Contribution, Past and Future." The following evening, S. J. M. Auld, of the American Locomotive Export Co. Inc. in London, will talk on the "Status and Importance of International Standardization." "Oil in Continental Africa" will be the subject of a lecture on Wednesday by R. Buttin, director of the Petroleum Society of French Equatorial Africa. The final lecture will be given by Karl Ziegler, president of the Max-Planck Institute, Germany. He will deal with "Organometallic Compounds in Petrochemistry," a field which he pioneered.

Various official social functions are being scheduled for the week of the congress—the main ones being a banquet at the Waldorf-Astoria Hotel on Wednesday, June 3, and a concert by the New York Philharmonic orchestra at Carnegie Hall the following evening. Tickets for all the functions are limited in number, and the demand for them in early registrations considerably exceeds expectations. The closing meeting of the congress will be held in Carnegie Hall on Friday, June 5, at 5:30 pm.

END

Put strength where it counts!



New Reynolds Aluminum

...eliminates over-design...gives more pipe strength per dollar

Now . . . from Reynolds Aluminum . . . a major advance in piping design. It's Reynolds new Heavy-End Pipe—pipe designed to put strength where strength is needed—at the *joint*. And it eliminates excess metal in the pipe body, to save up to 27% in piping costs.

With Reynolds new Heavy-End Pipe, you no longer have to over-design your system to allow for reduced joint strength. This tough, lightweight aluminum pipe gives you more usable pipe strength, cuts your piping costs, simplifies your design job.

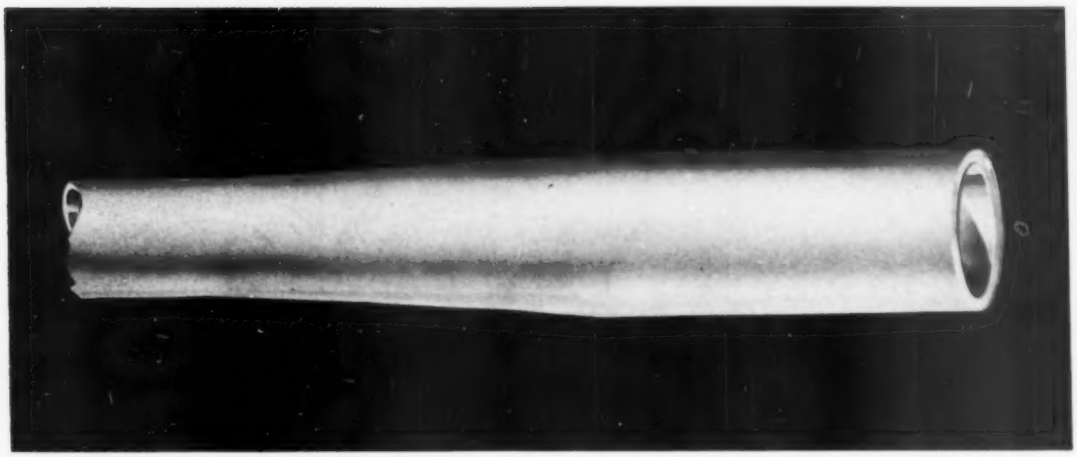
You design to uniform strength all through with Reynolds Heavy-End Pipe, and pay only for the metal required. No waste metal, no waste costs, no waste weight. Compensation for joint efficiency is built into the pipe.

Reynolds Heavy-End Pipe is available in Schedule 40 equivalent and Schedule 80 equivalent sizes, in 40 ft. lengths. Ends have the same diameter and thickness as standard sizes, so standard fittings can be used. Also, Heavy-End Pipe can be used interchangeably with other standard pipe.

Like all Reynolds Aluminum Pipe, Heavy-End Pipe costs much less than other corrosion resistant piping with equal performance. It won't contaminate the fluids it handles; it resists corrosion by most process liquids. More and more companies are changing to aluminum piping because it is lightweight, non-sparking, easily formed, joined, welded.

Be sure to consider the cost-cutting design-simplifying benefits of Reynolds H-E Pipe* in your next system. Get full details from Reynolds Metals Co., P. O. Box 2346-CM, Richmond 18, Virginia, or Reynolds Metals Co., International Sales, 19 East 47th St., New York 17, N. Y.

Save up to 27% in piping costs!



HEAVY-END PIPE

... cuts weight... simplifies design... strengthens joints

REYNOLDS HEAVY-END-PIPE DESIGN DATA

Schedule 80 Equivalent

Nominal Size	Major (Heavy End) O. D.	Major (Heavy End) Wall	Heavy End I. D.	Heavy[1] End Length	Minor Body O. D.	Minor Body Wall	Minor Body I. D.	Average[2] Weight Per Ft.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.300	2.900	10	3.130	.190	2.750	2.18
3½	4.000	.318	3.364	10	3.616	.201	3.214	2.68
4	4.500	.337	3.826	11	4.102	.213	3.676	3.24
5	5.563	.375	4.813	11	5.137	.237	4.663	4.53
6	6.625	.432	5.761	12	6.157	.273	5.611	6.33
8 (3)	8.625	.500	7.625	12	8.107	.316	7.475	8.61
10 (3)	10.750	.593	9.564	13	10.164	.375	9.414	14.36

(1) Length of heavy end wall thickness exclusive of transition zone
(2) Based on 40 ft. length

Schedule 40 Equivalent

Nominal Size	Major (Heavy End) O. D.	Major (Heavy End) Wall	Heavy End I. D.	Heavy[1] End Length	Minor Body O. D.	Minor Body Wall	Minor Body I. D.	Average[2] Weight Per Ft.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.216	3.068	10	3.192	.137	2.918	1.63
3½	4.000	.226	3.548	10	3.684	.143	3.398	1.97
4	4.500	.237	4.026	11	4.176	.150	3.876	2.35
5	5.563	.258	5.047	11	5.223	.163	4.897	3.21
6	6.625	.280	6.065	12	6.269	.177	5.915	4.21
8	8.625	.322	7.981	12	8.237	.203	7.831	6.36
10 (3)	10.750	.365	10.020	13	10.332	.231	9.870	9.11

(1) Length of heavy end wall thickness exclusive of transition zone
(2) Based on 40 ft. length

Nominal Size	6061-T6, 6062-T6 Alloy				6063-T6 Alloy			
	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	4490	1497	1122	898	3205	1068	801	641
3½	4145	1382	1036	829	2960	987	740	592
4	3885	1295	971	777	2780	927	695	556
5	3475	1158	869	695	2490	830	622	498
6	3355	1118	839	671	2400	800	600	480
8	2970	990	742	594	2120	707	530	424
10	2815	938	704	563	2010	670	502	402

Nominal Size	6061-T6, 6062-T6 Alloy				6063-T6 Alloy			
	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	3180	1060	795	634	2270	757	568	454
3½	2900	967	725	580	2070	690	518	414
4	2700	900	675	540	1920	640	480	384
5	2360	787	590	472	1680	560	470	336
6	2150	717	537	430	1530	510	382	306
8	1885	628	471	377	1346	439	338	269
10	1718	573	429	344	1220	407	305	244

REYNOLDS ALUMINUM

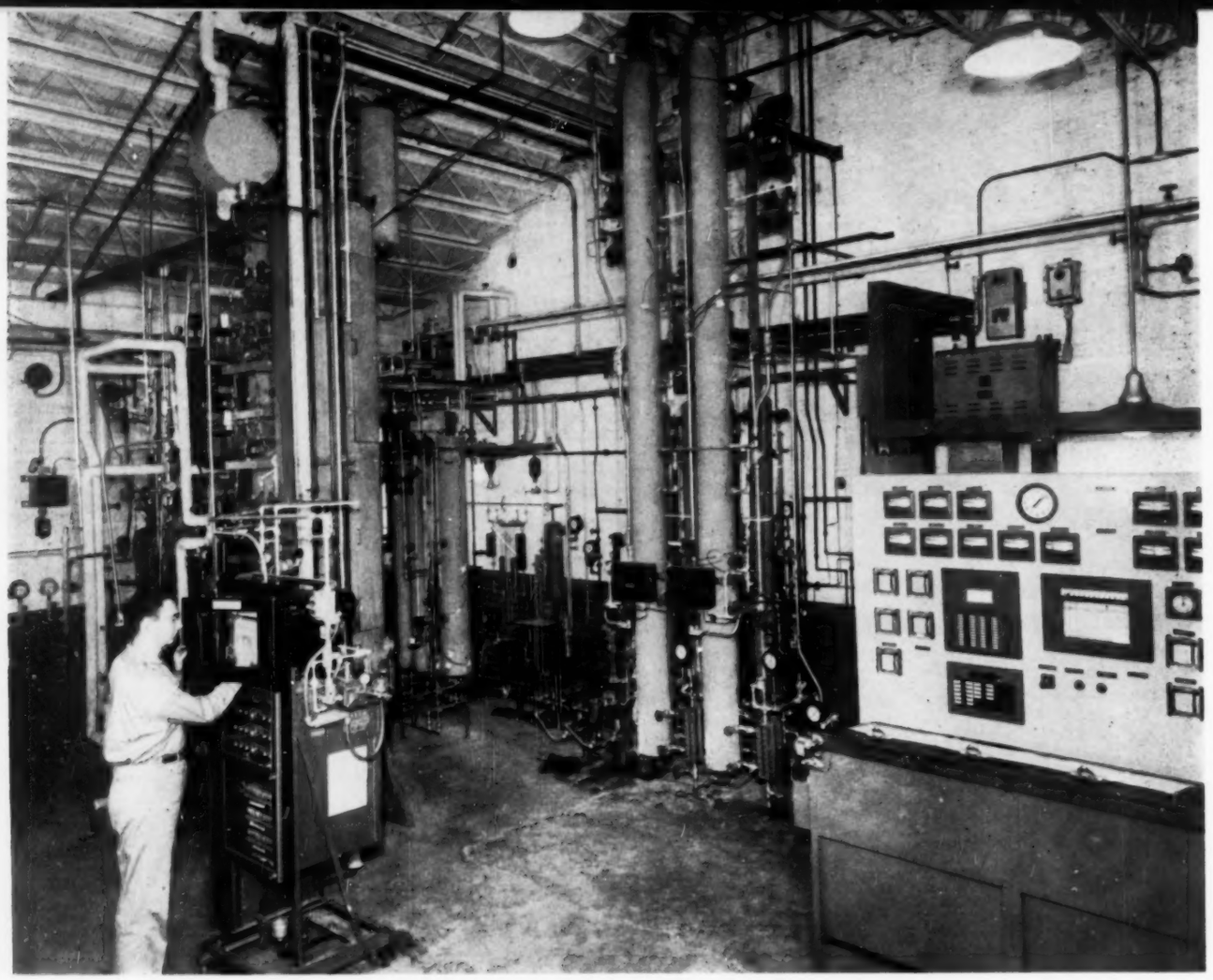


Fig. 4

The Molex process†— refining advance by UOP

by D. B. Broughton and D. B. Carson
Universal Oil Products Co., Des Plains, Illinois

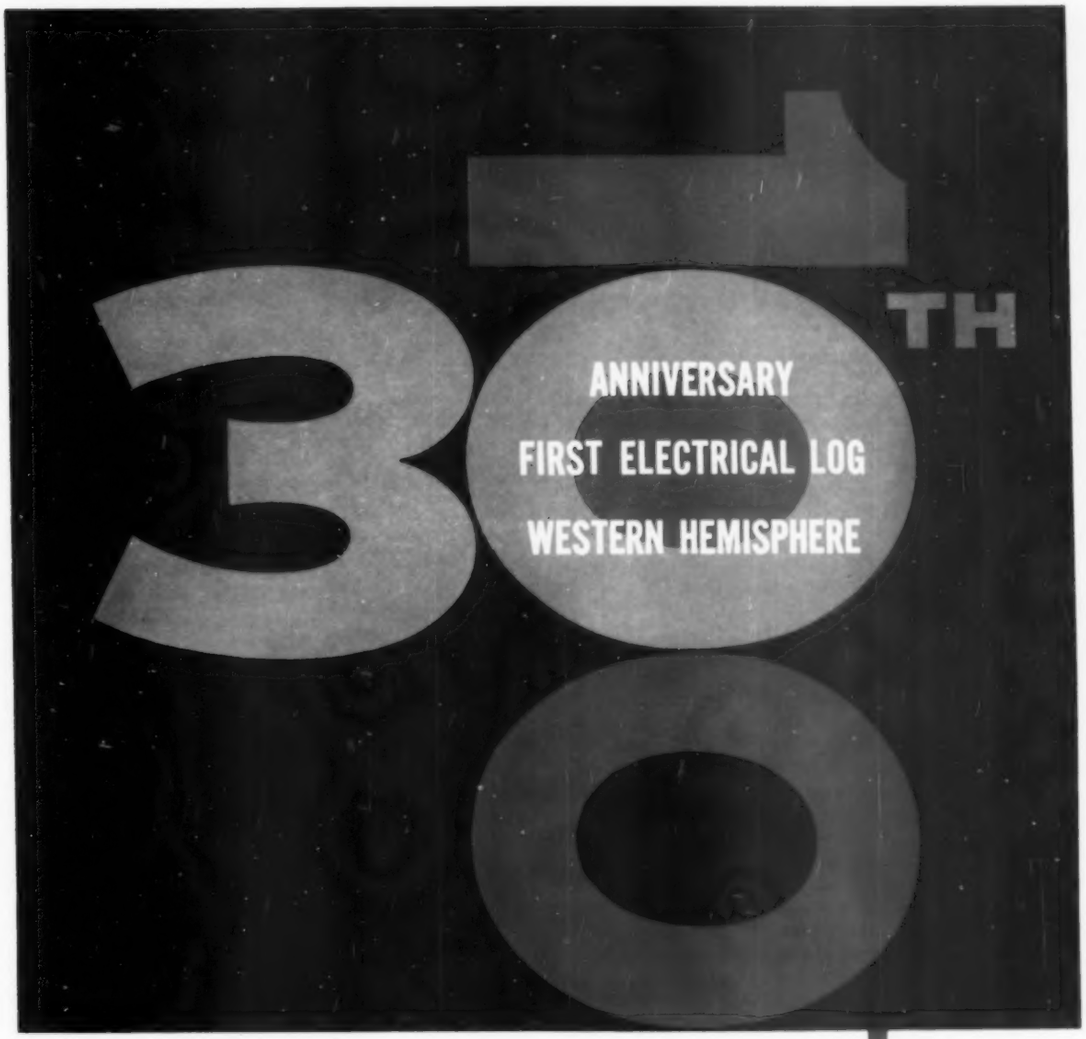
EVEN the best gasolines marketed today contain appreciable quantities of normal paraffins—materials so inferior that they are used as the lower standard on the octane performance scale. The Molex* process which UOP is announcing today for the first time provides the industry with a practical tool for the clean removal of these low quality components.

Normal paraffins occur throughout the entire gasoline boiling range. Of these only the lightest, normal butane, has acceptable quality by today's octane number standards. As the molecular weight of the normal paraffin increases, its engine performance deteriorates rapidly. Fig. 1, a plot of the leaded Research octane number of norman paraffins versus the size of the normal paraffin molecule, shows graphically this deterioration.

A large proportion of the normal paraffins generally found in gasolines are derived from the light straight run and natural gasoline fractions which usually are not subjected to any processing other than fractionation. Normal paraffins spread throughout the boiling range also are present even in the most highly reformed gasolines. Fig. 2 shows how the normal

†Taken from a paper presented at the Western Petroleum Refiners Association, March 17, 1959, San Antonio, Texas.

*Trademark



100 YEARS FOR THE OIL INDUSTRY
30 YEARS FOR SCHLUMBERGER
March 6, 1929 Schlumberger ran the first Electrical Log in the Western Hemisphere. Well R-216, Shell Company, La Rosa, Bolivar Coast, Venezuela.

Anniversary of the Oil Industry

SCHLUMBERGER

WHEREVER THE DRILL GOES — SCHLUMBERGER GOES

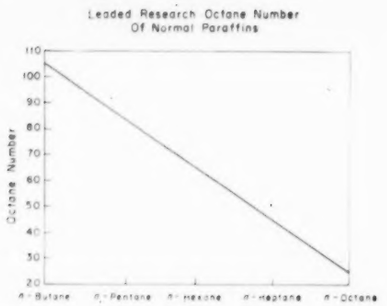


Fig. 1

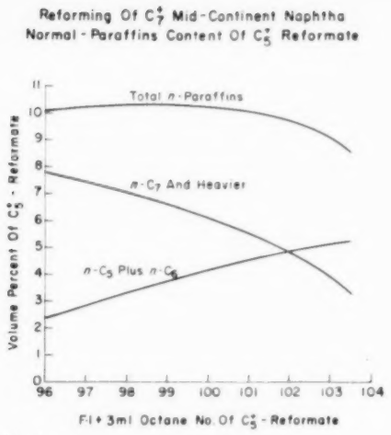

Reforming Of C7+ Mid-Continent Naphtha
Normal-Paraffins Content Of C5+ Reformate
Total n-Paraffins
n-C7 And Heavier
n-C5 Plus n-C6
Volume Percent Of C5+ Reformate
F1 + 3ml Octane No. Of C5+ Reformate

Fig. 2

paraffin content of a reformate produced from a typical Mid-Continent naphtha varies with the severity of the reforming. Note that there is always an appreciable percentage of heptane and heavier normal paraffins, and that as reforming severity increases, the amount of normal pentane and normal hexane increases.

Because normal paraffins are spread throughout the entire boiling range and because the concentration of each particular normal paraffin is low, separation by fractionation has generally been considered to be impractical. Molex will perform the heretofore impractical removal of normal paraffins as a class in one economical operation.

When faced with customer complaints on antiknock performance, refiners have in general resorted to producing gasolines having sufficient aromaticity to mask the adverse effect of the normal paraffins. This is, however, only a partial solution. The customer has only his own vehicle as an octane-test machine. A highly aromatic fuel, despite its high Research octane rating, does not necessarily perform well in the customer's engine because his engine responds to an octane number somewhere between the Research and the Motor method ratings. One sees recognition of this in the requirement of lower sensitivity for pipeline gasoline. By the removal of the poorest class of hydrcarbons usually found in gasoline, Molex enables the refiner to produce a gasoline of lower aromatic content—therefore of lower sensitivity—for a given Research octane number rating. The gasoline of lower aromatic content has an additional advantage, in that it is cleaner burning than fuels of high aromatic content. Consequently, an engine using the lower aromatic fuel will demonstrate a lower octane requirement increase.

The Molex process separates all of the normal paraffins as a group from the other types of hydrocarbons through the use of "molecular sieves." Although the affinity of such materials for normal paraffins has long been known, having first been discovered in the naturally occurring mineral Chabazite, the practical problems inherent in the use of such adsorbents have prevented commercial application for hydrocarbon type separation.

The objectives in developing the Molex process were:

First, to develop a process which would remove normal paraffins throughout the gasoline boiling range in a single treatment;

Second, to develop a continuous process;

Third, to develop such a process capable of clean separations using a minimum of utilities.

These objectives have been realized. Fig. 3 shows the Molex flow. Basically the unit consists of a primary separation section and a secondary separation section.

In the Molex proces, the separation is carried out under conditions which are easily incorporated into normal refining operations. The adsorbent is used in a fixed bed isothermal manner, and feed and separated product streams are uniform and continuous. Temperatures and pressures are moderate and ordinary materials of construction are satisfactory. The use of this new process thus permits refiners to easily and economically remove the objectionable normal paraffins from their gasoline products, and, by the use of other available processes, such as Penex® and Platforming,® convert them into desirable gasoline constituents.

With regard to the applications of the Molex process, there are occasions on which it is not competitive with fractionation, other occasions on which it is very definitely superior to fractionation, and still other occasions on which it will perform a separation impossible by fractionation. In a separation such as isobutane from normal butane, or isopentane from normal pentane, the choice between fractionation and Molex will depend upon factors such as concentration, capacity and product purity. On more complex hydrocarbon mixtures, such as a pentane-hexane mixture, Molex presents pronounced technical and economic advantages.

Fig. 4 is a picture of the UOP Molex pilot plant which has demonstrated its reliability with steady operation over extended periods of time, and from which much of the data to be presented in this paper has been developed.

Table I gives results which were obtained in pilot plant operation with three different mixtures of C_5 and C_6 hydrocarbons. These are first, a mixture of C_6 paraffins; second, a mixture of C_5 and C_6 paraffins and, third, a light extract cut of Rexformate® which has olefins and aromatics present in addition to the paraffins. In each case the pilot plant performed a very respectable separation, one that fractionation would be hard pressed to equal.

An important question, of course, is the economics of the Molex application. Qualitatively, in any separation of normal paraffins from other hydrocarbons Molex will consume less utilities than fractionation. For less difficult separations, the installed

TABLE I—PILOT PLANT SEPARATIONS ON PENTANE-HEXANE STOCKS

	Stock A—Nat. Gaso. Hexanes			Stock B—Nat. Gaso. $C_5 + C_6$			Stock C—Light Reformate		
	Feed	Denorm. Product	Normal Product	Feed	Denorm. Product	Normal Product	Feed	Denorm. Product	Normal Product
Analysis, Wt. %									
nC_5	0.0	0.0	0.0	17.5	0.4	41.2	23.0	1.7	70.3
nC_6	39.1	0.7	99.2	25.3	0.6	57.6	8.5	0.3	25.9
Iso-paraffins	51.8	84.4	0.7	51.5	88.2	1.1	54.0	78.1	1.7
Naphthenes	9.1	14.9	0.1	5.7	10.8	0.1	6.5	9.3	0.2
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	4.9	7.0	0.1
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.6	1.8
Total n-paraffins, Wt. %	39.1	0.7	99.2	42.8	1.0	98.8	31.5	2.0	96.2
Octane Number									
F-1 Cl.	61.4	79.5	28.0	66.8	84.1	46.0	78.6	90.0	56.7
F-1 + 3ml	84.4	96.0	63.7	87.4	98.4	72.9	94.5	102.0	80.8
F-2 Cl.	59.4	80.4	25.3	—	83.6	41.9	76.0	85.9	53.3
F-2 + 3ml	85.3	97.4	65.3	—	101.2	75.1	95.1	101.2	—

TABLE II

ECONOMIC COMPARISON OF FRACTIONATION WITH MOLEX PENEX ISOMERIZATION OF 2500 B/D OF MIXED PENTANES AND HEXANES TO 100.3 F-1 PLUS 3ml

Investment Cost	Penex With Fractionation	Penex With Molex
Penex Unit	$ 780,000	$ 650,000
Separation Unit	900,000	855,000
Total	$1,680,000	$1,505,000
Operating Cost, $/Day		
Labor and Administration	267	267
Steam	640	240
Fuel	80	72
Cooling Water	75	30
Power	84	63
Sieve Replacement	—	150
Maintenance	145	130
Local Taxes and Insurance	121	108
Total	1,412	1,060
Yields		
Isomerized Product, B/D	2,417	2,455
Fuel Gas, 10^6 BTU/D	573	298
Value of Incremental Yield, $/Day		
Isomerized Product	—	239
Fuel Gas	55	—

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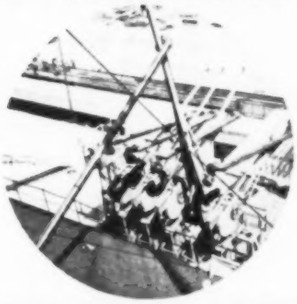

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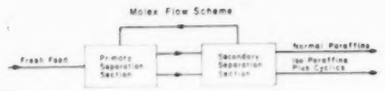

Fig. 3

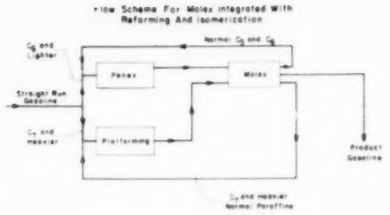

Fig. 5

cost of Molex will be higher. Another generality is that as increasingly precise separations are desired by fractionation, the investment and utilities requirements for a given capacity increase sharply. This is not true of Molex. Moreover, many separations are so complex that they cannot be accomplished with fractionation, but can be made deadily with Molex.

Still another economic factor which must be considered in comparing Molex and fractionation for stocks of the type shown in Table I is the eventual destination of the normal pentane and normal hexane product. It is believed that these materials will find their principal outlet by isomerization to high octane, low sensitivity gasoline, employing processes such as Penex. In this type of processing, when fractionation is used to separate the isomerized products from unconverted normal hexane, C_6 cyclics tend to remain with the recycle normal hexane. Consequently, the recycle builds up in cyclic content to the point where a considerably larger isomerization unit is required. This problem does not arise when Molex separation is used, since in this case cyclics remain with the isoparaffins. The saving in isomerization investment cost can be credited to the Molex investment.

The economic comparison shown in Table II uses as a basis a pentane-hexane mixture of the type shown as Stock B in Table I. Steam cost has been taken on the basis of $0.35 per 1000 pounds. The fresh stock charge rate has been taken as 2500 B/D. By either route, Penex plus fractionation or Penex plus Molex, a total product having a leaded Research octane number of 100.3 is made. The overall yield is slightly better for the Penex plus Molex operation, resulting in a credit for this case

Table II shows that the Penex plus Molex case not only represents an investment of $175,000 less than Penex plus fractionation, but in addition operates for $352 a day less and produces an additional $184 per day of product. In its pilot plant experience, UOP has operated for extended periods on this type of stock with no signficant deterioration in sieve activity. The replacement cost of sieves in Table II is believed to be a conservative extension of the operating life demonstrated in the pilot plant.

It has been shown previously that removal of normal pentane and normal hexane from light hydrcarbon cuts by Molex is both feasible and economic when compared with conventional fractionation. Let us now consider how Molex might be applied to upgrading the product from catalytic reformates contain C_5 through C_6 normal paraffins. Usually the amount of normal pentane plus normal hexane exceeds the sum of allthe heavier normal paraffins. However, as the molecular weight of the normal paraffin increases, the octane number becomes rapidly worse so that the removal of the C_7 and heavier normal paraffins is important from a quality standpoint. A separation of all normal paraffins from a reformate by fractionation is not practical: by Molex the separation is accomplished readily in one operation. This is shown by the pilot plant results tabulated in Table III. Also included in Table III are results of a Molex separation on the straight run stock to demonstrate the ability of the process to handle heavier normal paraffin components in higher concentrations.

Molex can be used in conjunction with catalytic reforming in several ways. It is of interest to investigate whether the addition of a Molex unit to a catalytic reforming unit has attractive economics. Consider the case of a refiner whose catalytic reformer is operating at its maximum severity for the required capacity. This refiner could remove heavy normal paraffins from his reformate by the addition of Molex, thereby increasing its octane rating.

It is also assumed that this refiner is not yet in need of the ultimate octane attainable through the Molex and only the heptane and heavier normal paraffins are removed from the final reformate. In evaluating the products from the Molex unit, gasoline price has been based on the 1958 edition of Platt's Oil Price Handbook, Gulf Coast low cargo price, and normal paraffins at light fuel oil price. Table IV presents the economics of Molex in this situation.

As Table IV demonstrates, this application of Molex pays out readily. In this application the pilot plant has operated for an extended period with insignificant decline in sieve activity. The sieve life assumed for this application is a conservative extension of demonstrated life.

Consider now the processing of a straight run gasoline to its ultimate octane number. In this case catalytic reforming, isomerization and Molex are employed as shown in Fig. 5.

The anticipated performance of this combination on a typical C_5 and heavier Mid-Continent straight run gasoline is shown on Fig. 6 as a plot of liquid yield based on

TABLE III—PILOT PLANT SEPARATIONS ON GASOLINE BOILING RANGE STOCKS

	Reformate Stock D			Reformate Stock E			Straight Run Stock F		
	Feed	Denorm. Product	Normal Product	Feed	Denorm. Product	Normal Product	Feed	Denorm. Product	Normal Product
Vol. % Aroms.	53			57			4		
ASTM Distn.									
I.B.P.	120			142			220		
10%	166			178			250		
50%	250			230			280		
90%	331			292			317		
E.P.	420			352			363		
Wt. % n-Parafins									
C_5	4.4	0.4	37.1	2.7	0.2	25.4	0.0	0.0	0.0
C_6	3.8	0.5	30.6	3.7	0.4	33.6	0.7	0.1	2.2
C_7	2.9	0.6	21.6	3.5	0.7	28.8	3.2	0.2	10.8
C_8							9.9	1.9	30.0
C_9	1.3	0.3	9.4	1.1	0.4	7.4			
C_{10}+	—	—	—	—	—	—	3.9	0.8	11.7
Total n-Paraffins, Wt. %	12.4	1.8	98.7	11.8	1.7	95.2	28.9	3.4	93.0
F-1 Clear O.N.	89.5	95.0	35.3	93.6	99.1	37.0	20.9	38.7	<0
F-1 + 3ml O.N.	98.2	101.3	65.3	101.2	104.9	65.2	53.8	65.7	10.3

TABLE IV—MOLEX SEPARATION OF C_7+ NORMAL PARAFFINS FROM REFORMATE

	B/D	F-1 + 3 ml. Octane No.	Value ¢/Gal.	Value $/Day
Charge	5,000	96.0	11.75	24,675
Denormal Product	4,570	99.1	13.19	25,317
Normal Product	430	—	9.63	1,739
Increase In Value				2,381
Molex—Installed Cost	$800,000			
Operating Cost, $/Day				
Labor and Administration			138	
Steam			120	
Fuel			15	
Cooling Water			26	
Power			8	
Sieve Replacement			218	
Maintenance			70	
Local Taxes and Insurance			59	
Total:			654	
Gross Profit, $/Day			1,727	
Payout, Before Taxes and Before Royalty, Years				1.27

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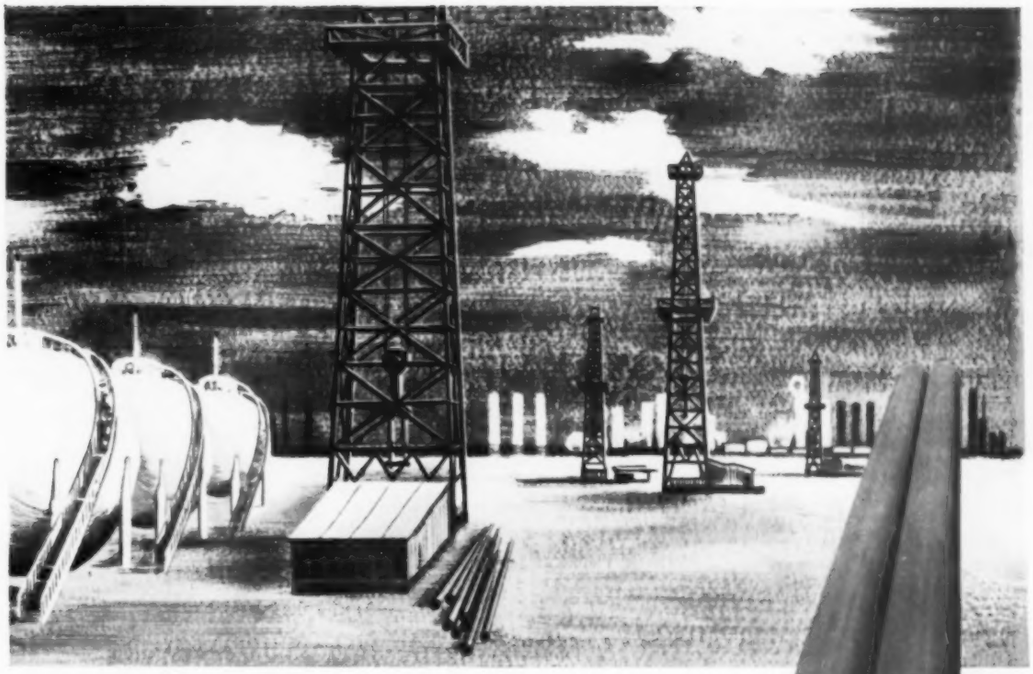

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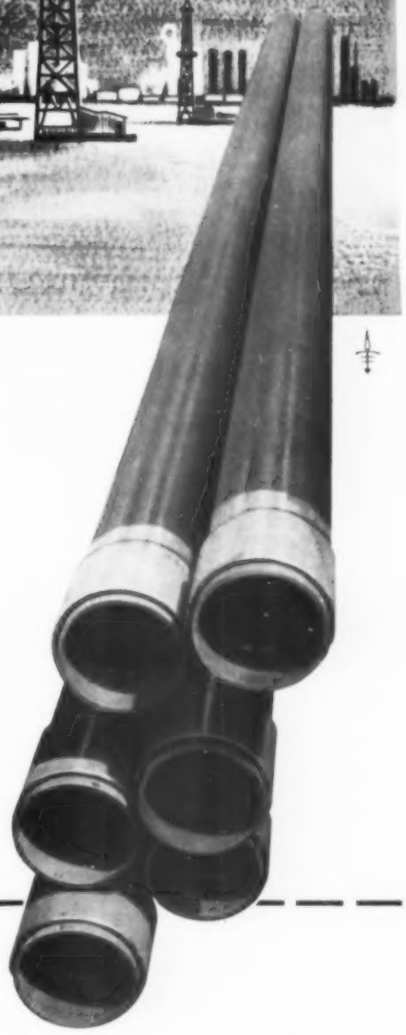

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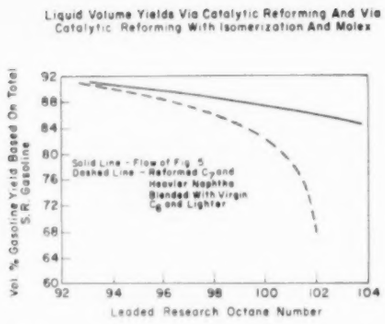
Liquid Volume Yields Via Catalytic Reforming And Via Catalytic Reforming With Isomerization And Molex
Vol. % Gasoline Yield Based On Total S.R. Gasoline
Solid Line - Flow of Fig. 5
Dashed Line - Reformed C7+ and Heavier Naphtha Blended With Virgin C6 and Lighter
Leaded Research Octane Number

Fig. 6

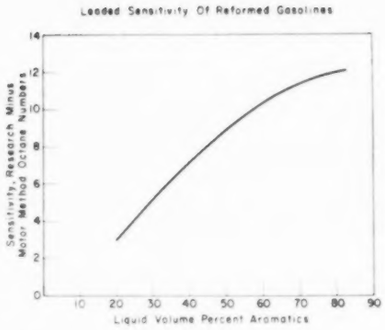
Leaded Sensitivity Of Reformed Gasolines
Sensitivity, Research Minus Motor Method Octane Numbers
Liquid Volume Percent Aromatics

Fig. 7

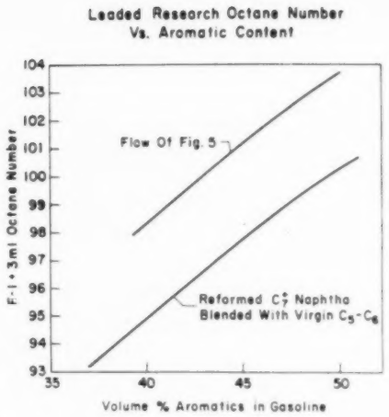
Leaded Research Octane Number Vs. Aromatic Content
F-1 + 3 ml Octane Number
Flow Of Fig. 5
Reformed C7+ Naphtha Blended With Virgin C5-C6
Volume % Aromatics in Gasoline

Fig. 8

straight run vs. leaded Research octane number of the produced gasoline. A dashed line is shown to represent the performance of a system in which the C_7 and heavier portion of the straight run stock is reformed and then blended with the virgin C_5 and C_6 material to give the gasoline product.

It can be seen from Fig. 6 that the flow scheme of Fig. 5 gives increasingly higher yields of gasoline than simple reforming as octane goals are set higher.

Since the ultimate leaded octane number of the total gasoline (reformate blended with the virgin C_5 and C_6 material) produced when reforming only is used is about 102, economic comparisons above this level, or even approaching it, are meaningless. The economics of the addition of Penex and Molex to a catalytic reformer have been evaluated on the basis of a fixed reforming severity.

Employing the processing arrangement of Fig. 5 on a typical Mid-Continent straight run gasoline containing 10.4 liquid volume percent C_5 and 14.2 liquid volume percent C_6, the economic data shown in Table V have been developed.

In preparing Table V, it has been presumed that the Penex and Molex facilities are to be added to catalytic reformer capable of reaching 93 F-1 clear octane number. The addition of these facilities shows a very attractive payout. Actually, this straight run gasoline could be processed to higher final octane number if the reformer is operated at higher severity. Economics of such a case are necessarily vague because

TABLE V

ECONOMICS OF CATALYTIC REFORMING PLUS ISOMERIZATION PLUS MOLEX

Basis: Reforming Mid-Continent Naphtha to 93 F-1 Clear Octane Number, 10,000 B/D of Full Range Straight Run Gasoline

	Reforming Only	Reforming Plus Isomerization Plus Molex
Product Gasoline Including Light Straight Run F-1 + 3 ml Octane Number	96.9	102.1
Barrels/Day	8,776	8,580
Value, ¢/Gal.	12.10	15.56
Value, $/Day	44,600	56,071
Incremental Product Value, $/Day		11,471
Incremental Operating Cost, $/Day		1,710
Gross Profit, $/Day		9,761
Incremental Investment		$2,411,000
Before Taxes and Royalty, Years		0.68

of the absence of quoted prices on gasoline at octanes above 102. At reformer severities below 93, the economics of Molex plus isomerization are still attractive; for instance, on this stock at 85 F-1 clear octane reformate a payout time of $1\frac{1}{2}$ years is indicated.

It is apparent from Fig. 2 that substantial quantities of normal paraffins, heptane and heavier, can be made available as a byproduct of Molex treatment of reformates. This is an entirely new product from the industry, for which special uses may well develop. For example, these normal paraffins could be the starting point for synthesis of straight chain organic compounds of various types, such as aldehydes and alcohols. Certainly they would be a preferred stock for high temperature pyrolysis to make ethylene, etc., since normal paraffins are easily cracked. Another unique property of normal paraffins is that they demonstrate the highest heat of combustion per pound of any hydrocarbon. This property should be of value in preparing fuels for aeronautical purposes—jet or missile fuels. These normal paraffins can of course be recycled to the reformer as in our example, but it is predicted that, due to their specific chemical and physical properties, they will ultimately be of greater value in other applications.

The major product of any of the foregoing schemes applying Molex is gasoline. The gasoline so produced will have compositions different from gasolines as we know them today. The economic data which has been presented is based solely on Research octane numbers, but the benefit to the refiner from Molex goes beyond Research octane number economics. Molex is a tool for lowering the aromatic content of gasolines while maintaining high research octane numbers, thus lowering the sensitivity and the octane requirement increase. These are the other things which the ultimate consumer will notice in his automobile, in addition to the Research octane number.

Fig. 7 shows how the sensitivity of a reformed gasoline varies with the aromatic content. This approximate relationship holds for reformed gasolines including C_5 and C_6 in varying amounts regardless of charge stock source. Through the use of Molex the refiner is able to eliminate the worst paraffinic components from his product. For a given Research octane number, he therefore requires a lower aromatic content since the average quality of the paraffins is improved. The lower aromatic content results in a lower sensitivity. For the full range Mid-Continent naptha assumed in the development of Table V, the relationship between aromatics content and leaded Research octane number is shown in Fig. 8. Curves are shown for the case of Platforming only and the case of Platforming plus Molex plus Penex. It is apparent from these curves that at a constant Research octane rating a reduction of aromatics content of from 5 to 7%, depending on octane level, is accomplished by the use of Molex and Penex in conjunction with Platforming. Fig. 7 shows that this reduction in aromatic content results in lower sensitivity by approximately one full number.

In planning new facilities, a refiner is always interested in the ultimate quality of product the facilities can produce. The ultimate leaded Research octane number which can be produced from the Mid-Continent naptha when Platforming is the octane upgrading process involved only is about 102; Platforming plus Molex and Penex produces at ultimate severity a gasoline of about 105 octane number. Fig. 8 shows that at any fixed Platforming severity, the addition of Penex and Molex facilities wil give the refiner a potential increase of from 3 to 4 leaded Research numbers on this Mid-Continent stock.

In conclusion, UOP now offers to the industry a process to accomplish separation of normal paraffins as a class from narrow cuts or from full boiling range gasolines. The process has been shown to be economic not only when in competition with fractionation but also when called on to perform separations impossible with fractionation. It enables the refiner to produce gasoline of lower sensitivity than he can now produce.

Alternately Molex enables the refiner to raise the Research octane rating of his gasoline without increasing sensitivity. Extensive pilot plant work, which developed the data presented here, has demonstrated the technical practicality of the process. This process is a major step forward in separation techniques. END

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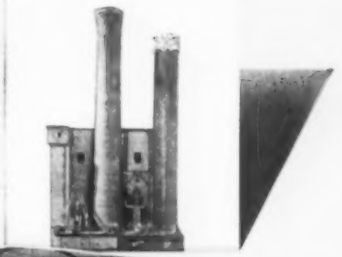

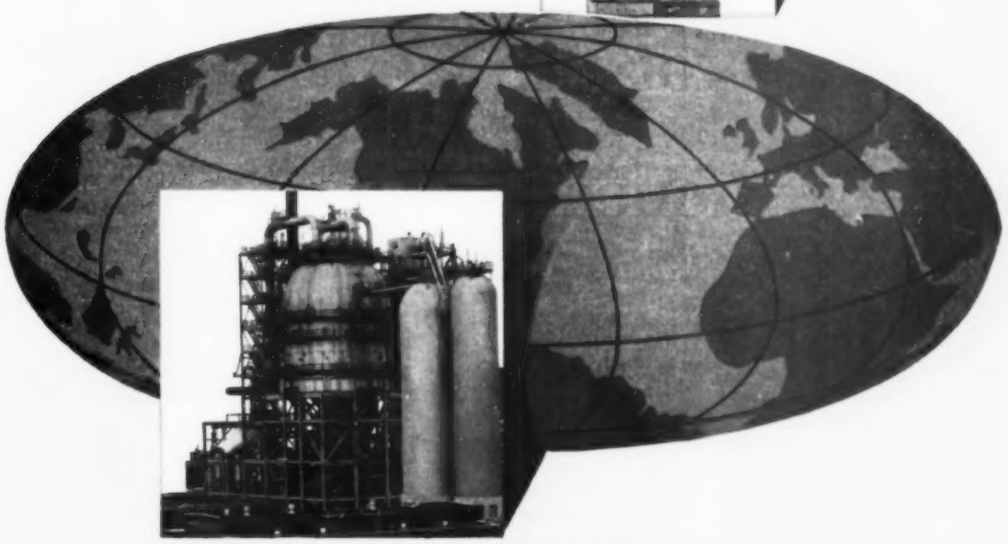

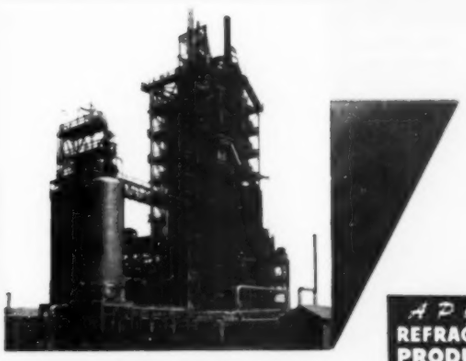

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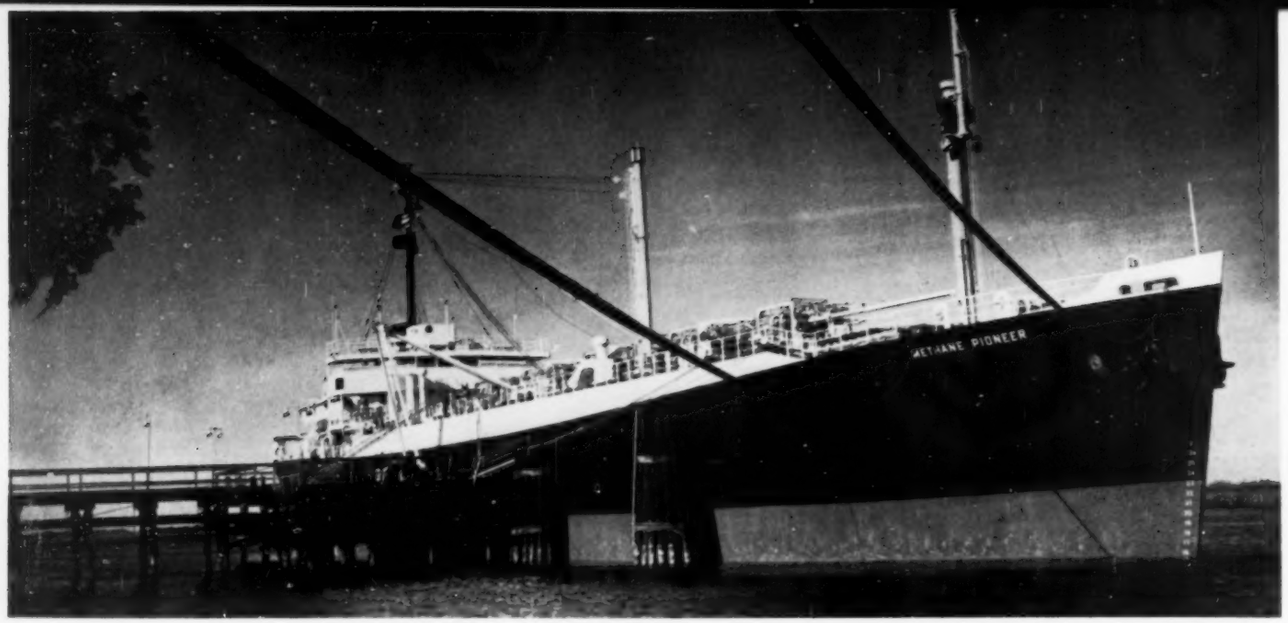


The "Methane Pioneer", first trans-ocean transporter of liquefied methane, shown at the start of her voyage from Lake Charles, La., to England.

New power for the world?

"Methane Pioneer" arrives in UK

by Cecil W. Wood

A SMALL vessel—the "Methane Pioneer"—carrying the first cargo of liquefied methane ever to be transported by sea drew quietly alongside a jetty at Canvey Island in the Thames Estuary for the North Thames Gas Board on February 21, without the official recognition the occasion seemed to warrant.

The 3,000-ton tanker, following trial runs in the Gulf of Mexico, completed under the British flag a journey which may prove of the greatest significance—a 23 days' voyage from Lake Charles during which much experimental work was carried out by the American and British scientists aboard. The most important aspects studied were the effect on the methane containers of the strains of such a journey and the question of gas loss.

Prior to conversion, this 5,000-ton dry cargo ship was a Liberian vessel, but as the "Methane Pioneer" after conversion it is British registered and its first cargo, as loaded, was about 2,000 tons (3,032,000 barrels) of liquefied methane from natural gas at a temperature of 258 F. at atmospheric pressure, reducing it to 1 600th of the space it would occupy as a gas. The vessel is jointly owned and operated by British Methane Ltd.—a Bahamian corporation formed by Constock International Methane Ltd.—and the British Gas Council. Its maiden voyage climaxes over five years of research and development initiated by The Union Stock Yard & Transit Co., Chicago, and carried on by Constock, jointly owned by Union Stock Yard and Continental Oil Co.

The cargo for this pilot voyage was loaded from a special Constock natural gas liquefaction plant near Lake Charles, Louisiana, but official information must be awaited as to the amount delivered. It is stated that approximately one-half of 1% would evaporate each day of the voyage. On this basis the delivery should have been about 1,770 tons and the net value to the gas industry about 850-900,000 therms. A reliable report suggests that the amount actually delivered was appreciably less than this. The gas was allowed to escape to the atmosphere through vents located high above the ship's deck. The "Methane Pioneer" is oil fired, but any later such carriers would be designed to utilize the waste gas, either by reliquefying the boil-off and replacing it in the cargo tanks, or by using it as engine fuel.

It is claimed by Continental Oil that liquefied methane is safer to transport than gasoline. Numerous special safety features were incorporated in the design of the "Methane Pioneer," the only ones mentioned, however, are a system to detect and counteract any escaping gas which might collect in the ship and another to protect the steel hull from the deleterious brittleness that might result in the event of rupture of the cargo containers carrying liquid at such an exceedingly low temperature.

All that has been revealed in the U.K. in regard to the ship's tanks is that they are five in number, constructed of aluminum insulated with 12 in. of balsa wood and fitted with an outer steel jacket. Their overall design and location is such that they can accommodate the effect of the ship's movement at sea. Special ballasting compensated for the lightness of the cargo. It is asserted that it is impracticable to hold large amounts of methane as a liquid under pressure, and Continental Oil claims that until the development of Constock's revolutionary system there has been no transportation of methane as a liquid without pressure: conventional LPG ships carry a mixture of propane and butane (or bottled gas) under pressure in heavy metal cylinders.

No opportunity has been given to see the special reception and storage facilities installed to designs determined by the North Thames Gas Board in conjunction with the two main contractors—Whessoe Co. Ltd., and The A.P.V. Co. Ltd. Nor has it been possible to secure for publication any technical description of the facilities. It is understood that the two 1,000-ton (90,000 cu. ft.) tanks erected, one by each contractor, have been deliberately based on somewhat differing design features for test purposes. Even so, basically each is an inner aluminum container and an outer steel shell, with the space between packed with an insulant. There will be a continuous boil-off from

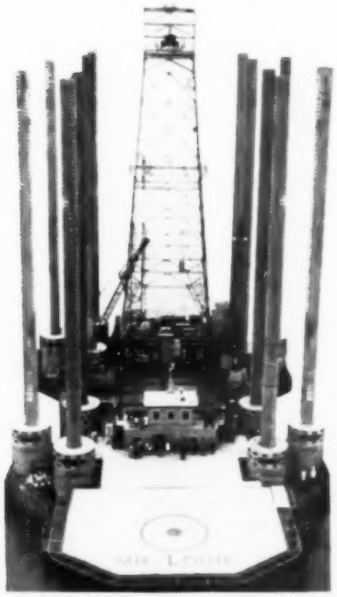
On 23,400-foot well . . .

MID-CONTINENT RIG HANDLED HEAVY LOADS WITH EASE

23,400 feet drilled . . . 660,000-pound hook loads handled . . . with completely trouble-free drawworks operation! That is the record of the Mid-Continent U-1220-EB Electra-Flow Drawworks on Great Western Drilling Company's Rig 44 in Pecos County, Texas.

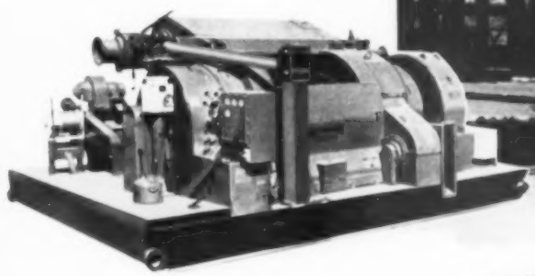
During the drilling operation, Rig 44 set 15,849 feet of 9⅝" casing—believed to be the longest string of this size ever run. This casing string had an effective weight of 660,000 pounds, a load which the drawworks handled easily, prior to cementing.

For complete information about the U-1220-EB . . . or any Mid-Continent drawworks, contact your nearest Mid-Continent representative.



"MR. LOUIE" FEATURES U-1220-EB

Also the choice of Universal Drilling Co., a Mid-Continent U-1220-EB Drawworks was selected for their new self-elevated offshore drilling platform "Mr. Louie," recently christened at New Orleans.



See Mid-Continent's Exhibit at the Tulsa Oil Show, May 14-23

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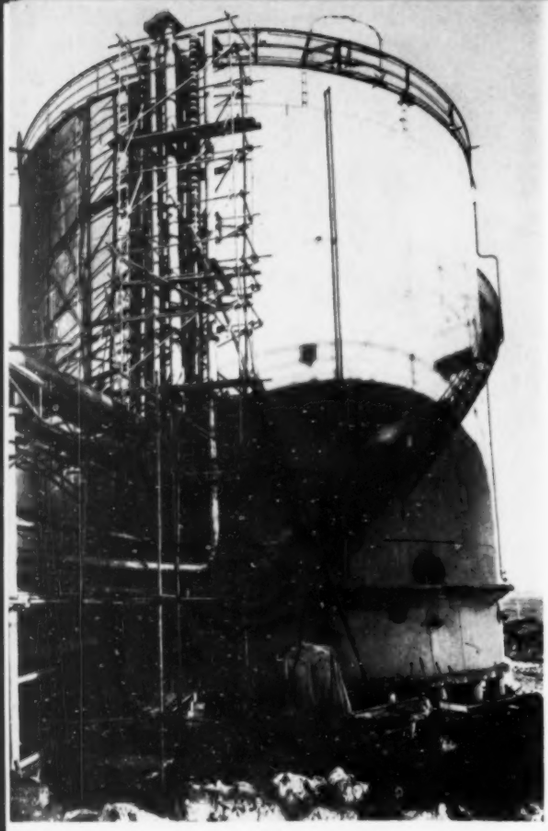


90,000 cubic feet insulated aluminum tank constructed by The A.P.V. Company, Crawley, Sussex, for the North Thames Gas Board for the storage of liquid methane at 260° F.

these tanks and this material will be contained in a small gasholder of the dry-sealed Wiggins type, whence it will be pumped into the main system.

All that has been released by the gas board in regard to the Whessoe and A.R.V. aluminum tanks is that they are among the largest ever built in Britain, that they employ large-scale aluminum fabrication and field welding to stringent standards throughout, and that they probably represent the largest amount of fully radiographed aluminum welding ever to be executed on site in the country.

The 2,000 ft of 10-in. aluminum pipe from ship to shore was also supplied by A.P.V. This is heavily insulated. Specially designed ship's pumps were used for discharging through 7-in. flexible hose covered with 6-in. of insulation and end-fittings supplied by The Compoflex Co. Ltd. The hose is said to consist essentially of stainless steel spiral which give strength to a wall constructed of terylene fabric laminations and special films. Compoflex also supplied special gunmetal fittings, built into the hose during fabrication, for joining to the pipeline.

Unloading had to await the completion of certain on-shore work and could not be started until March 2. It was expected to take some 10 days so as to enable certain experimental work to be carried out. The gas board regards the "time factor" as of no import at the opening stages of this bold experiment: the all-important factors are safety and gaining the maximum information possible at every phase of operations.

As to the capital cost of the trial shipment, it has been stated that the Gas Council's half-share in the cost of purchase and conversion of the vessel is £715,000 (about $2 million), while the Canvey Island installations provided by the North Thames Gas Board for pumping and storage will cost some £400,000 (about $1.12 million). The latter excludes the cost of the main line from Shell Haven.

The parliamentary secretary to the ministry of power has said recently that "the costs of this experiment are being shared by the British gas industry and the American interests concerned. The total costs to the gas industry is estimated to be about £1,500,000 ($1.4 million)."

It is planned to vaporize the methane by heat exchange or steam and, at this stage, not to make use of its cold content or refrigerating capacity. It would be converted to gas under pressure and this pressure used to convey the gaseous methane into the board's transmission lines. A new transmission line from Canvey Island connects with a high-pressure main laid between Shell Haven and the Romford gas works and the gaseous methane will be mixed with refinery gases supplied from Shell Haven.

Town gas as supplied by the board is distributed at 500 Btu per cu ft while the methane is double this value, but the latter will be transformed into gas of the 500 Btu level at Romford by the Onia-Gegi catalytic process. A great advantage of methane gas as compared with coal gas is that the former is free from sulfur and carbon monoxide.

E. F. Battson, chairman of Constock International Methane, has claimed this voyage as the prelude to a new era when natural gas (or rather its methane content), previously wasted or shut in for want of accessible markets in many parts of the world, will be liquefied and transported by tanker to countries where gas is not naturally available and energy must be supplied by gas manufactured from coal or oil at high cost.

The British Gas Council's attitude at this early stage is naturally more cautious. It believes that three trial deliveries will probably be needed to gain the necessary experience and service "know how." Then, if the transportation problem is proved to have been overcome, "a possibility" is seen eventually of importing gas at several pence per therm below the present manufacturing cost. If it can be put into the gas mains at a lower price than the cost of making ordinary gas then, taking the long-term view—10 years is suggested—gas might be one pence a therm cheaper. This caution is realistic.

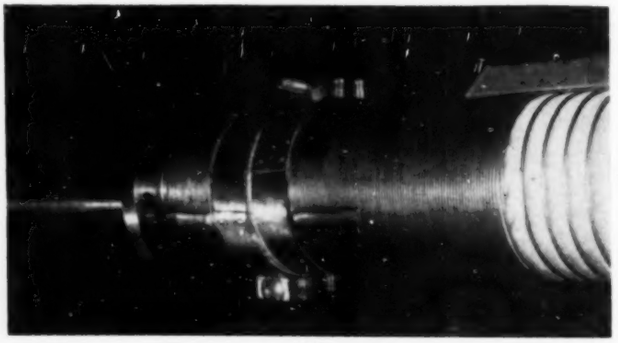
From the "Methane Pioneer" to the fleet of much larger tankers necessary to make this experiment truly economical for large-scale and continuous production may prove more lengthy and certainly more costly thna many have been led to believe. Many fresh problems are likely to rise with a much higher scale of operations.

Meanwhile, all praise is due to the many on both sides of the Atlantic who have contributed to the successful transportation and reception into Canvey Island of the trial cargo which initiates this bold experiment.

END

2,000 ft. insulated aluminum pipe line, 10" diameter, to convey liquid methane from the ship to the storage tanks on the North Thames Gas Board site at Canvey Island chosen for the methane Importation Trial Scheme.

A section of the seven-inch Compoflex flexible tubing and fitting, specially designed and thermally insulated for transferring liquid methane, at a temperature of minus 260° F, from the tanker to the tanks of the North Thames Gas Board at Canvey Island.



Papua. A route to a new drilling site is prepared.
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Radioactive Fuel Tests

The fuel and fuel-additive diet of each cylinder in an automobile engine can now be pinpointed by radioactive-tracer methods, R. L. Courtney of Ethyl Corp. research laboratories told the recent annual meeting of the Society of Automotive Engineers. By showing which cylinders are starved and which are overfed, these methods point the way to fuel savins, better engine performance, and lower octane requirements, he said, in a paper co-authored with D. E. Cooper and C. A. Hall.

By "tagging" a fuel component—either hydrocarbon or additive—with a radioactive element, Ethyl scientists can tell the proportions of it reaching each engine cylinder, Mr. Courtney explained. Quick-acting sampling valves, which also double for the conventional spark plugs, take only a thousandth of a second to snatch a sample of each cylinder's feed. The concentrations of the tagged components are determined by the "radiation count" of the samples.

As radiation-emitting tags, Ethyl has used carbon-14 and two isotopes of hydrogen-deuterium and tritium, Mr. Courtney continued. Tritium was found best for the work because of its low cost per unit of radiation, and because it can be inserted in hydrocarbons without disturbing their carbon skeletons, he said.

Ethyl's studies have confirmed that the distribution of a given fuel component among the cylinders depends on how much of the component evaporates en route. Thus, some cylinders may not receive their full shares of high-octane components and antiknock additive, Mr. Courtney reported. Tracer studies provide the data needed to attack this problem in two ways—through tailoring of fuels and additives, and through design changes in carburetors and manifolds.

In another SAE paper by Ethyl's Richard Abowd, Jr., it was reported that radioactive-tracer studies have shown that pre-ignition is a prime cause of piston-ring wear.

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Arrow at Pedernales (upper center) near the northern tip of the Orinoco River delta in Venezuela area where scientists from affiliates of Standard Oil Co. (New Jersey) are investigating formation of an oil deposit. The oil, not much older than the pyramids, is still in the embryonic stages of development. It is hoped this first opportunity to observe nature in the act of creating an oil reservoir will result in new knowledge concerning the origins of oil, and aid future explorers in their search for petroleum deposits. (Inset shows location of Pedernales area in Venezuela.)

Recent Sediments Studied

A party of scientists from three affiliates of Standard Oil Co. (N.J.) has begun an intensive examination of a remarkable oil deposit in the delta of the Orinoco River in eastern Venezuela.

The oil is a mere five to ten thousand years old, which means that it is still in the embryonic stages of its development. Oil produced from the average commercial well is generally in excess of 10 million years old.

This discovery, according to Jersey Standard, has provided the first opportunity to observe nature in the act of creating an oil reservoir. The presence of oil-like hydrocarbons in sediments has been noted before, but this is the only case known in which hydrocarbons have actually begun to collect in a stratigraphic trap. The deposit is thus the most conclusive evidence to date that the oil-forming process is a continuing one.

Investigation of the embryonic oil is being conducted jointly by the Jersey Production Research Co., of Tulsa, and Esso Research and Engineering Co., Linden, N. J.

Bore holes are being sunk at the site of the oil trap. Rock samples are being taken at various intervals as the drill descends, and continuous cores will be taken once the oil sand is reached, at a depth of about 115 ft. In addition to the sediment samples, water and gas samples are being collected whenever possible. All cores are being examined in the field laboratory, and some will be sent to the USA for further studies.

Sale To United Carbon

Husky Oil Co. has confirmed sale of its 51% interest in Argus Petroleum Corp. to United Carbon Co. Husky now holds a 9.69% net-profit interest in any future production from the Argus properties.

Automatic Gas Products Plant

Sunray Mid-Continent Oil Co. has started construction on a new $600,000 automatic gas-products plant in Jackson County, Texas. The refrigeration oil-absorption-type plant will process approximately 30 mmcf/d, and will produce about 27,000 gal/d of propane, isobutane, normal butane, and natural gasoline. All products will be sold as a composite stream by pipeline. The unit will be one of the industry's first gas-products plants of its type to operate unattended at night. Four men will man the plant during daylight hours.

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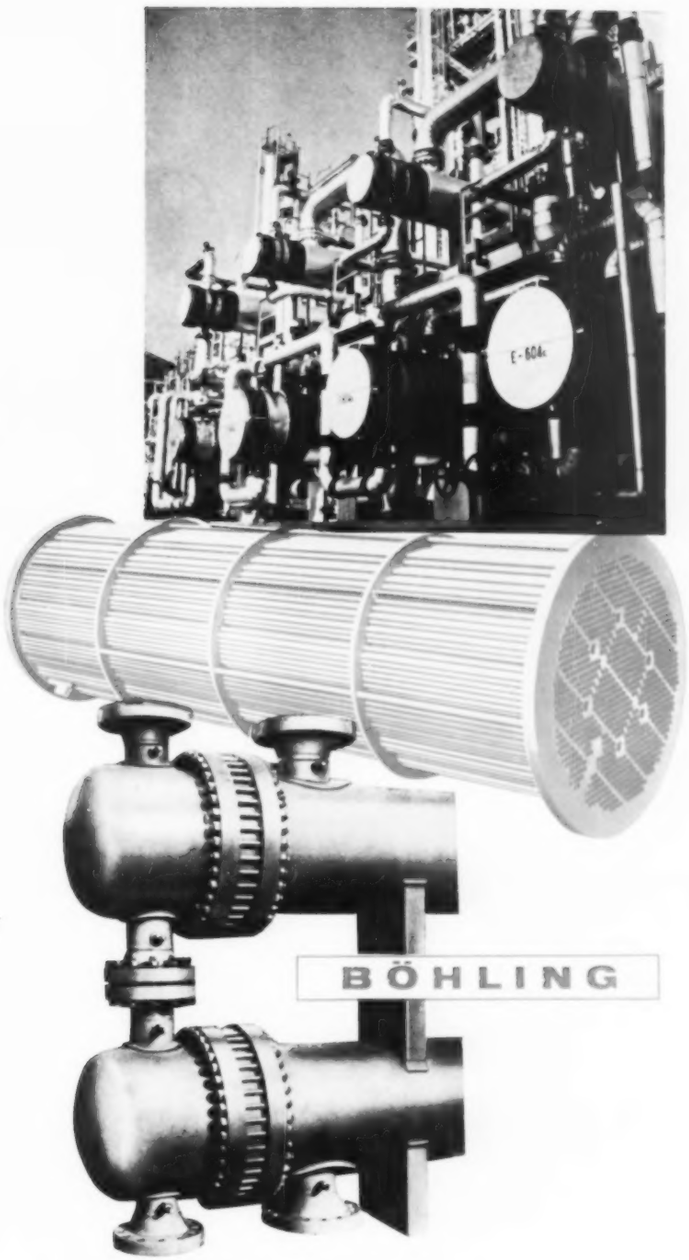

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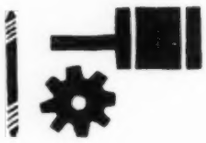

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Petroleum Technology in the USSR

(Continued from page 46)

d. Improved exchange of technical information among the various oil regions and between Russia and the free world.

In respect to the latter, it may be appropriate to add that, in the past, Russian engineers and scientists have had the advantage of the exchange, for the reason that the flow of Russian knowledge to the free world was indeed quite small. On top of that there was a language barrier which acted to restrict information which was available to libraries and files where it found little or no use. With a large number of technical publications now available at reasonable costs, the exchange has become a two-way street. We can certainly assume that the Russian petroleum technology will continue to be fostered by the State; hence we can predict that its application to development of Russian oil reserves will continue to grow and perhaps at a somewhat greater pace than now.

Summing up, there is room for improved rig performance by a more effective backup of rigs with equipment, repairs, supplies, and more effective planning. We can expect an improvement in efficiency of the Russian rigs. It is unlikely, however, that the projected rig performance of 5,800 ft per rig per month in 1960 can be achieved. In spite of this, however, the projected production rate of 4,800,000 b/d in 1965 appears to be a reasonable target. END

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Suez Canal Traffic at Record High

(Continued from page 40)

Southbound oil traffic is of little significance to the Free World today. The bulk of its small total shipments—2.4 million tons or 48,000 b/d in 1958—were Soviet Bloc exports to Egypt. In view of Egypt's rising domestic oil production, these shipments are likely to decline in the not too distant future. In the absence of any unexpected changes, this would reduce southbound oil shipments to a trickle. Not included in the Suez Canal oil statistics are southbound shipments of lubricating oils which amounted to 348,000 tons in 1958, an 8% reduction from the 1956/57 period.

Of interest are also the type of tankers transiting the Suez Canal. While no separate statistics are available on sizes of tankers, an indication of what tankers used the Canal may be gained from the fact that last year 75% of all ships going through it had a draft of 30 ft or less while only about 2% had a draft of 34-35 ft which would put them in the modern super tanker class. The reason for this was that the dredging of the Canal back to the 34 ft draft level of the period before the destructions of November 1956 was not completed until the second half of 1958. When it was finished, the number of ships with 34-35 ft draft showed an immediate sharp increase. In the last quarter of the year they accounted for nearly 6% of all ships.

The Canal is currently undergoing an improvement program, called the Modified Eighth Program, since it is an adaptation of the Eighth Improvement Program started in 1954 by the Suez Canal Co. This program which is to be completed in the course of 1960, according to Canal authorities, comprises the widening and the deepening of the Canal over its whole length. The maximum draft will be increased to 37 ft which would allow the transit of ships with a gross tonnage of 45,000 tons.

The current improvement program reflects the Egyptian government's belief that the Canal will continue to be the main artery for the Middle East's growing oil exports. As of now, this assumption can hardly be challenged. Right after the Suez crisis there was much talk about the building of large new pipelines to the Mediterranean to reduce the Suez Canal's transportation primacy over Middle East oil. Not one of these projects has materialized. In fact, some pipeline projects which had been firmly decided upon before the Suez crisis, such as the additional line from Iraq across Syria and the relocation of the unused pipeline to Haifa, were subsequently abandoned. At the same time Iraq, which up to now has relied mainly on pipelines for its oil exports, is getting a large tanker port at the head of the Persian Gulf, preparatory to a sharp increase in oil exports from its southern fields. Iran also is building a large new tanker loading port. Thus, for better or for worse, Middle East oil exports are coming to depend increasingly on passage through the Suez Canal. END

CENTRAL AMERICAN REVIEW

BAHAMA ISLANDS

PHYSICAL DEVELOPMENT

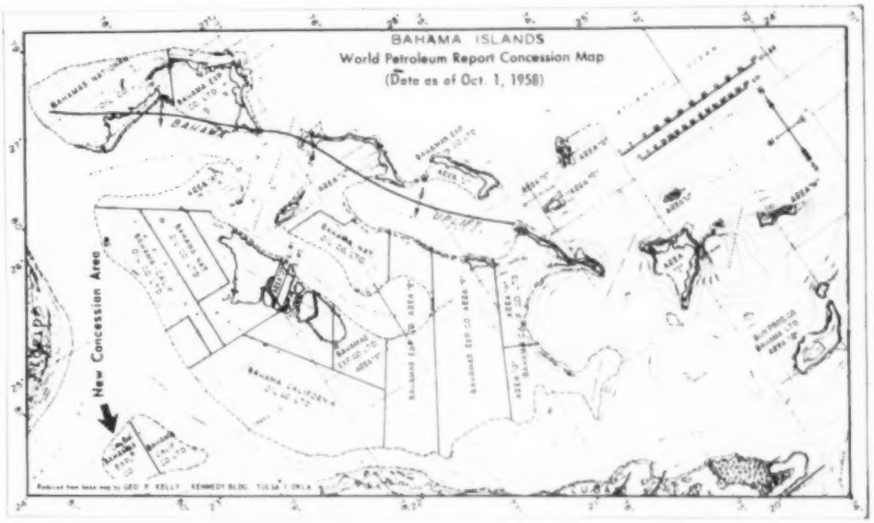
EXPLORATION: There have been no oil finds yet, and before 1958 only one well had been drilled (as covered in *World Petroleum Report—1958*—see map, that report). That well, by Superior Oil Co. of California, went to 14,575 ft and, although dry, found a thick section of marine sediments. All this area is considered part of a large Caribbean basin which includes Cuba's northern coast, the Bahamas, and the southern part of Florida, where some oil is now being produced.

Bahama California Oil Co. and Bahamas Gulf Oil Co. drilled a joint exploratory test in 1958 on Cay Sal Bank. The well, Cay Sal 4-1, was drilling at 16-17,000 ft, on Feb. 4, 1959, from a self-contained platform located in 30 ft of water. The well is located at latitude 23° 49' 24" N. longitude 80° 12' 24" W., approximately 15 miles north and 56° east of Cay Sal Island. Several new companies, including Siebens Leaseholds Ltd. of Calgary, Canada, and Consolidated Cuban Petroleum Corp. obtained exploration licenses during 1958.

OIL LAWS*

No important changes in oil laws occurred during 1958. The oil law is summarized in *World Petroleum Report—1958*, with a longer resumé given in the 1957 edition.

*Translations of the complete text of oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).



BARBADOS

PHYSICAL DEVELOPMENT

EXPLORATION: The sixth exploratory well by Barbados Gulf Oil Co., Morgan Lewis No. 1, was abandoned at 15,077 ft, February 4, 1959—with no oil or gas shows encountered. All previous wells had been dry, although two of them had gas shows.

Kerr-McGee earned a 25% interest in the prospecting license over the entire island of Barbados, held by Barbados Gulf Oil Co., after reaching a "certain stage" in drilling Gulf Morgan Lewis No. 1.

PRODUCTION, REFINING, MARKETING: There is neither production nor refining in Barbados. Consumption is very low—all of it imported.

OIL LAWS*

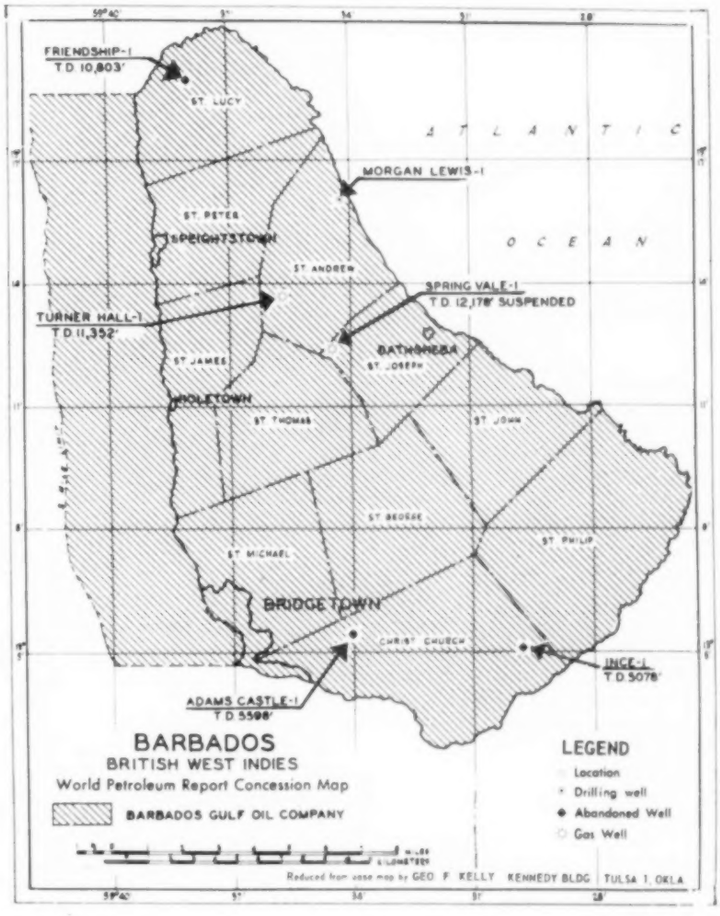
Citations: Laws governing exploration and exploitation of petroleum within Barbados follow: Petroleum (Amendment) Act of 1953—An Act to Amend the Petroleum Act 1950; Petroleum Act 1950 (passed January 5, 1950); An Act to Amend the Petroleum Act 1950 (passed June 19, 1953); Petroleum Winning Operations Bill, Taxation Bill—55 pp. Copies of these are kept on file at WPR office.

On January 12, 1959, a new taxation law entered into operation, known as the Petroleum Winning Operations Taxation Act, 1958 (1958-43). It contains provision for a 10% depletion allowance, among other things.

*Translations of the complete text of oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

NATIONAL FACTORS

The same considerations apply to investment favorability in Barbados as are found in the Bahamas, i.e., governmental stability, favorable marketing position, etc. END



BRITISH HONDURAS

PHYSICAL DEVELOPMENT

EXPLORATION: See *World Petroleum—1958*, p. 69, for description of British Honduras Gulf Oil Co.'s exploration in conjunction with Shell Oil in northern British Honduras. The company has drilled nine exploratory wells, with oil shows in one of them. The latest well, Basil Jones No. 1, was bottomed at 7,322 ft in October 1958. No results have been announced. On October 20, 1958, oil prospecting licenses held by British Honduras Gulf Oil Co. expired, and the company converted half of this area to oil mining leases.

During May 1958, Bandini Petroleum Co., an independent company from Los Angeles, formed Belize Petroleum Co. Ltd. to hold prospecting licenses and a working agreement with West Caribbean Oil Co. (a subsidiary of Moriqui Exploration Co., another California independent). The holdings of Bandini and Moriqui companies were farmed out to Phillips Petroleum Co., which plans an exploratory well in southern British Honduras early in 1959.

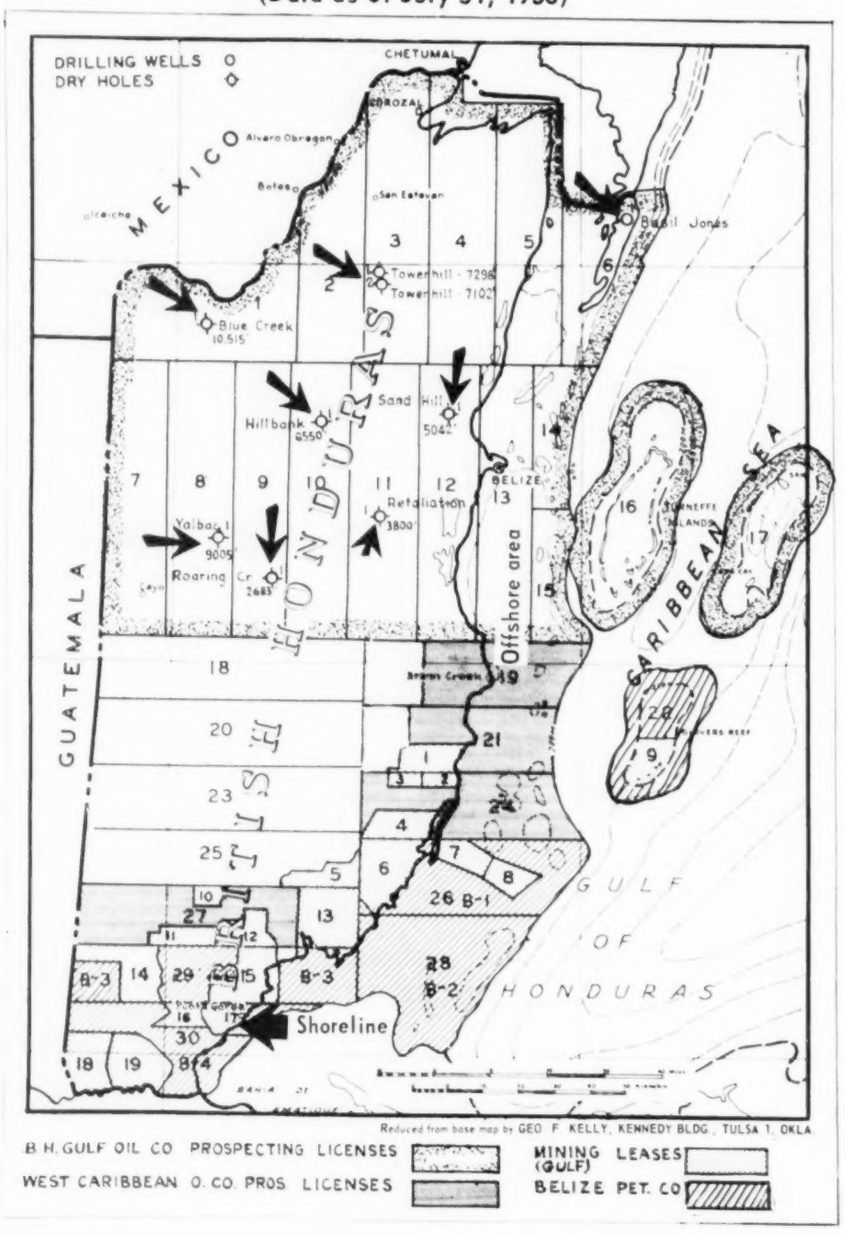
The leases held by Gulf have 30-year durations. The oil prospecting licenses held by the West Caribbean Oil Co. were granted in June 1958, and run for two years. The oil prospecting licenses held by Belize Petroleum Co. were granted in June 1958. Two of them will run for two years, and two will run for four years.

Gulf has no rigs working now; one has been turned over to Phillips to spud southern test.

British Honduras

World Petroleum Report Concession Map

(Data as of July 31, 1958)



OIL LAWS*

Controlling Statutes:* Governing statutes in British Honduras are as follows: No. 17 of 1937, The Petroleum (Production) Ordinance, 1937; No. 4 of 1939, An Ordinance to Amend the Petroleum (Production) Ordinance, 1937 (No. 17 of 1937) and to repeal the Oil Mines Ordinance—Chapter 86 of the Consolidated Laws, 1924; No. 12 of 1941, The Petroleum (Production) (Amendment) Ordinance, 1941; Statutory Instruments No. 56 of 1949, Oil Mining Regulations made by Governor in Council under Section 13 of the Petroleum (Production) Ordinance, 1937; Statutory Instrument No. 5 of 1958, Regulations made by the Governor in Council under Section 13 of the Petroleum (Production) Ordinance, 1937.

Model Leases include: Oil Mining Lease—Model Clauses (Crown and Alienated Lands); Oil Prospecting License (Crown and Alienated Lands) Model Clauses.

Recent legislation includes the Oil Mining (Amendment) Regulations, 1958. It changes annual exploitation surface taxes to range from British Honduras $.50 during the first year of the oil mining lease to BH $3.00 during the 10th and each subsequent year (35 US cents to US $2.10 approx.).

*Copies of these laws are kept on file at the offices of *World Petroleum Report*, 604 Fifth Avenue, New York 20, N.Y.

OIL LAW SUMMARY†

While the original petroleum legislation was Oil Mines Ordinance No. 32 of 1920, the controlling law at present is Petroleum (Production) Ordinance No. 17 of 1937 and the Oil Mining Regulations (Statutory Instrument No. 56) of 1949, as amended. The law declares that all "petroleum existing in its natural condition in strata in British Honduras is . . . vested in Her Majesty, and Her Majesty shall have the exclusive right of searching and boring for and getting such petroleum." The Governor in Council, "on behalf of Her Majesty," may issue exploration licenses, prospecting licenses, or mining leases. The landowner is to receive a 5% royalty on any oil which, but for the ordinance, would be vested in him. A licensee or lessee, unable to carry out all of his intended operations by means of private arrangement, may obtain from the Director of Surveys, with the approval of the Governor in Council, an "ancillary right" permitting him to engage in the necessary activity, subject to the payment of compensation to the persons affected.

For a summary of the law's provisions, see *World Petroleum Report—1958*, p. 69.

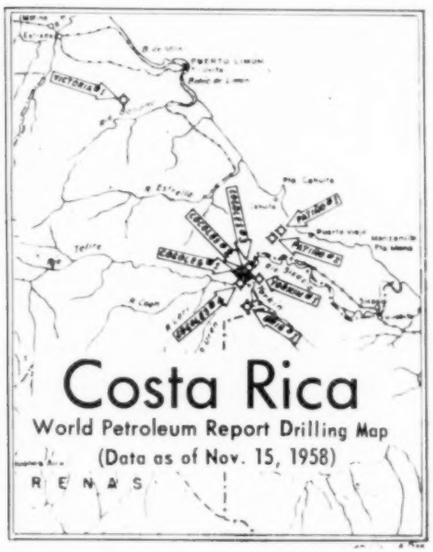
The terms of oil exploration licenses, oil prospecting licenses, and oil mining leases are not specified by the ordinance, but are left to regulations. The Regulations of 1949 (Art. 4) state that model clauses (not published but available for inspection at the office of the Colonial Secretary) may or may not be used in any particular license or lease, as the Governor in Council deems necessary.

†*Source:* Much of the background material for this review is taken from a summary prepared for the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) by Ely, McCarthy, and Duncan; Tower Building, Washington, D.C. END

COSTA RICA

PHYSICAL DEVELOPMENT

EXPLORATION: There is only one exploring company at present, Cia. Petrolera de Costa Rica, subsidiary of Union Oil of California. During 1958, Gulf Oil Corp. acquired a 50% interest in Union's oil rights, including those in Panama.



COSTA RICA — Union Oil Co. Wildcat Drilling

Name of Well	Location	Started	Status
Coocles No. 1	Limon province	12-20-56	To 8,672 ft., 5-20-56; noncommercial.
Cocoles No. 2	Limon province	7-10-56	Oil flow at 7,407 ft.; later went to salt water.
Cocoles No. 3	Limon province	1957	Abandoned dry at 5,740 ft.
Cocoles No. 4	Limon province	1957	Abandoned dry at 7,063 ft.
Victoria No. 1	Limon province	Late 1957	Abandoned dry early 1958.
Liverpool No. 1	Limon province	?	Abandoned dry mid-1958.

Drilling by Cia. Petrolera has been unsuccessful so far (see *World Petroleum Report—1958* for map and details). Victoria No. 1 (see map) was dry at slightly under 11,000 ft in 1958. The company plans drilling in 1959 on new structures, including one near Estrella River, about 23 miles south of Limon.

As of December 9, 1958, two other unidentified companies were applying for concessions.

PRODUCTION, REFINING, MARKETING: There is no production or refining. Union transferred its marketing activities in Costa Rica and Panama to Gulf during 1958.

Consumption during 1958 was about 3,800 b/d (crude-equivalent basis), 5.8% over 1957.

OIL LAWS*

The government has been working on a draft oil law for a number of years. It is not yet complete, and will not be for some time; however, meanwhile the government has decided to accept concession applications on the basis of the conditions contained in the accompanying summary (which may be taken as an approximate summary of the proposed oil law).

* Translations of the complete text of oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

DRAFT OIL LAW SUMMARY

The government of Costa Rica is considering only concession applications made on the following basis:

EXPLORATION:—Duration: Four years, extendible four years if a 9,000-ft to 12,000-ft rig is working; two years more if two rigs working. **Area:** Must be on either Atlantic or Pacific side, not both. Base concession unit is 12,500 hectares. Maximum 400,000 hectares (1,000,000 acres, approx.) per concessionaire. **Minimum Investment:** On concession approval, must deposit $12,000 for each exploration unit, which will be minimum investment for two years, including equipment purchase, etc. Following two years minimum is $18,000 per unit, $24,000 per unit in first extension and $30,000 in second. Sums not spent become property of State. **Surface Tax:** $1.250 per unit (10 US cents per hectare or four US cents per acre), plus $250 per unit (two US cents per hectare or 0.8 US cents per acre) for the university tax (geology school).

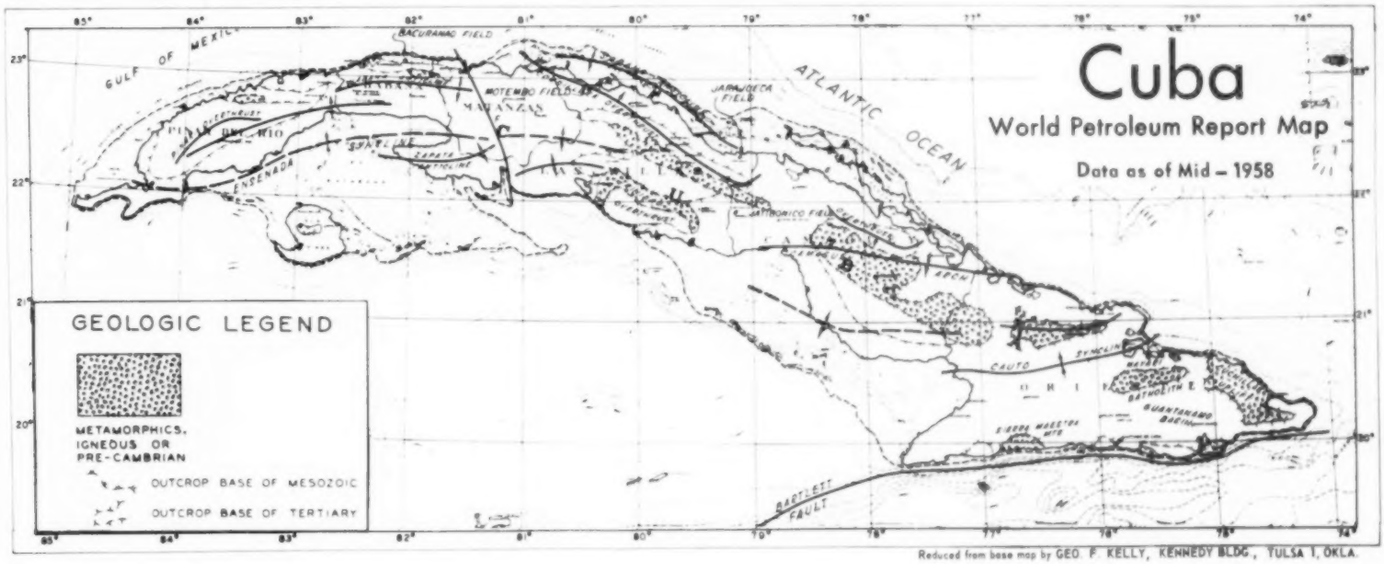
EXPLOITATION—Duration: 40 years, extendible "by agreement." **Area:** Basic unit is 3,125 hectares. Maximum is 48 units or 150,000 hectares per concessionaire. **Minimum Investment:** $10,000 per unit per year during first 10 years, to be deposited in advance. **Surface Tax:** Annual tax is $3,000 per unit (96 US cents per hectare) during first three years, rising 20% of the first year's tax each year thereafter until 20th year. After 20th year will decline 10% yearly, based on first year's tax. University tax is $1,000 per unit per year through 5th year; from 6th on will rise 10% yearly until 20th year, based on first year's tax, and will decline thereafter at rate of 5% yearly based on first year's tax. **Royalty:** 12.5% of gross production. **Depletion:** 12.5% of gross production. **Profits Division:** After deduction of royalty and depletion, remaining 75% is divided equally between government and concessionaire.

NATIONAL FACTORS

The governmental attitude toward international investment is favorable. Taxation rates are not important, since oil will have a special tax rate in the forthcoming law.

Exchange Rate: Unit of currency is the colon, valued at 6.65 per US dollar on the free market and at 5.60 per dollar (buying) at the official rate. There is no remittance tax for transfers abroad made at the official rate. Approval on amount to be transferred must be obtained from the Exchange Control, and is limited to 10% of the investment annually. There is no limit on remittances for which the exchange is converted at the free market rate; however, an approximate 20% surcharge is added to the purchase price of exchange. Foreign companies which have sold exchange on the free market corresponding to their investments in Costa Rica may remit funds for amortization of capital, utilities, and interest if they produce export items and their activities are considered by the Bank of Costa Rica to be beneficial to the economy. END

CUBA



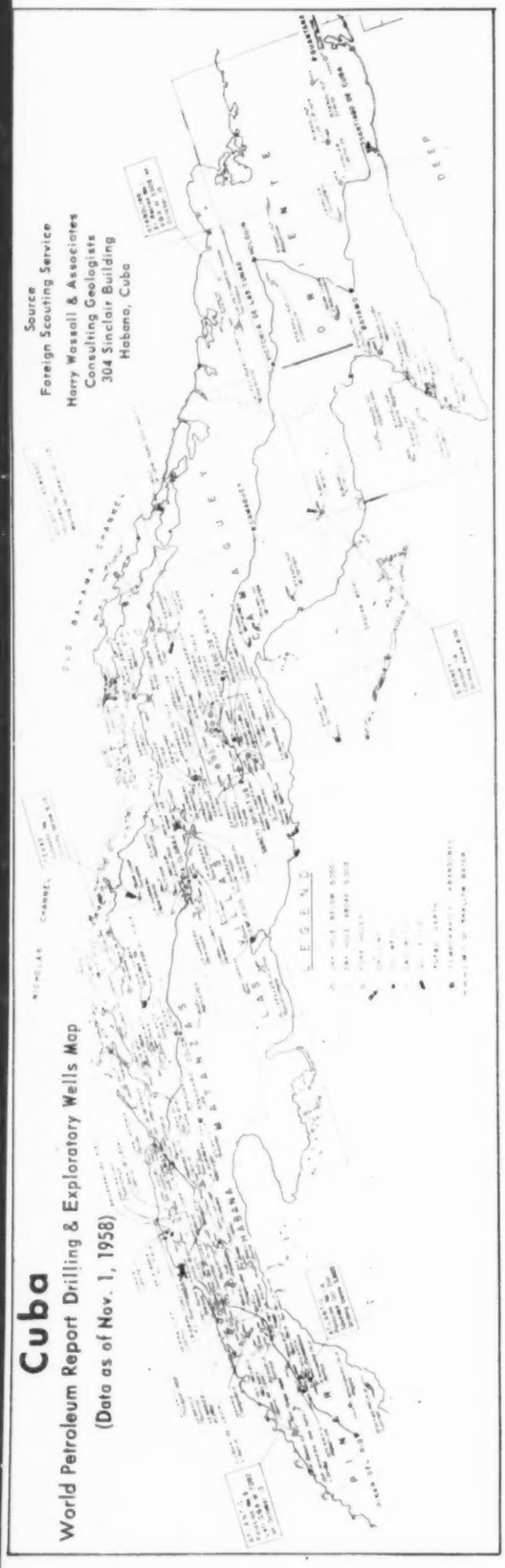
Reduced from base map by GEO. P. KELLY, KENNEDY BLDG., TULSA 1, OKLA.

CUBA *(continued)*

The Cuban oil industry in 1958 continued to be dominated by the lack of new oil finds, lower exploration activity, and relatively high movements of oil in and out of the country, as shown in accompanying tables.

Production, which had started to drop from a 1,500 b/d average in 1956 to 1,081 b/d in 1957, declined still further to about 928 b/d during 1958.

Exploration and drilling activities generally hit the same kind of downgrade as production, with the year-end seeing a new low in footage being drilled.



PHYSICAL DEVELOPMENT

EXPLORATION: In the closing months of 1958, there were some spotty jumps in exploration. However, drilling remained below 1957 levels. Most major companies' plans remained relatively indefinite for the future. Possibly the most significant shift which is taking place is that the majors are taking over the dominant role once held by the more aggressive independent wildcatters. News of actual searching and testing by the larger investors has naturally been slim; the smaller companies tend to "talk up" their plans and hopes for progress.

The number of majors interested in Cuba has increased over the past year. These now include Standard of Indiana, Atlantic Refining, Shell, Jersey Standard, The Texas Co., Gulf, and California Standard. The year 1959 should see some fairly thorough exploration by these firms as well as by the larger independents. For example, The Texas Co. has started a series of deep tests in Las Villas province as part of a $3 million drilling obligation on a Gulf Oil farmout in order to earn a 50% interest in the related acreage. Jersey Standard is exploring a similar area in Matanzas and Havana provinces, relatively inactive sections of the island. Socal has been doing seismic work off the north coast of Camaguey province. An exploratory test being drilled offshore between Cuba and the Bahama Islands by Gulf and Socal could prove to be of considerable importance if it shows any valuable geological information about the entire area. A discovery there could be significant to both islands.

CUBA—Well Data

	1958 (First 6 mos.)	1957
Exploratory wells completed	22	36
Oil producers	0	0
Dry holes	22	36
Development wells completed	16	53
Oil producers	9	26
Dry holes	7	27
Total wells completed	38	89
Footage drilled	83,631	195,859
Exploratory	53,631*	170,773
Development	30,000*	125,086
Rigs drilling	(as of 6/31)	
Rotary	2	4
Cable-tool	3	7
Total	5	11

*Amounts for exploration and development footage are estimates; total footage, however, is final.

One of the most important wells being drilled in Cuba is the Texaco test near Sagua la Grande, in Las Villas. Progress was slow, but the well was reported in October 1958 to be below 7,300 ft.

Atlantic Refining Co. had gone below 5,100 ft in its Palacios No. 3, in Pinar del Rio, and was clearing the site for Palacios No. 1A. October reports indicated the company had hit the 5,100-ft depth in Palacios No. 3 in only 12 days. It was understood this good rate had resulted from use of jet-type bits, and $7^{3}/_{4}$-in. drill collars in an $8^{1}/_{2}$-in. hole.

Field drilling is being confined chiefly to Bacuranao, where four wells are in process. Cruz Verde No. 10 has been completed. Consolidated No. 19 met with considerable trouble in penetrating a slanting hard-quartz rock layer at 1,005 ft.

A geochemical survey had been planned for late in 1958, using an Atlantic Refining Co. process, to cover some one million acres along Cuba's northern coastline. The technique detects the presence of gas seeps in water-covered areas. With Atlantic as the operator, partners in the survey include Esso Standard, Royal Dutch-Shell, and California Standard.

Cuban Stanolind has continued a series of stratigraphic tests in Oriente Province in spite of difficulties being encountered in that area. However, year-end reports were that the firm had decided to quit Cuba. Siboney-Caribbean is drilling its test in Camaguey province on the southern coast, and was below 7,400 ft in September.

CUBA—Crude-Oil Production, 1958
(Barrels Per Day)

January	1,400	July	855e
February	1,100	August	874
March	1,100	September	894
April	1,010	October	877
May	900	November	701
June	900e	December	519

Year (1958) 928 b/d (partly estimated)

REFINING: Refining capacity held fairly constant from 1957 to 1958. However, it is going to take a sharp upturn in 1959 and 1960 as new plants are completed and put onstream.

The new plant in 1958 was the Refineria de Petroleo Santa Maria SA, a 400 b/d refinery which began operations in August at El Cotorro.

In October, construction started on a new 3,000 b/d $3 million refinery at Cienfuegos in Las Villas province, on the south coast. The contract was awarded to The Refinery Engineering Co., Tulsa, Okla., by Transporte Reca SA, a Cuban firm which now has a 2,000 b/d plant at Cabaiguan in the same province.

CUBA—Oil-Industry Summary
(Barrels Per Day)

	1958 (est.)	1957
Demand	60,000 to 70,000[1]	60,000
Crude production	928[1]	1,081
Crude imports	61,613[2]	41,400
Refining capacity (oper.)	86,200[3]	59,200
Major product imports	19,316[3]	35,855
Major product exports	15,446[2]	NA

[1] Estimates for the year.
[2] First-quarter average.
[3] Expected to rise to approximately 103,750 b/d during the next year or two (see text).
NA—Not Available.

OIL LAWS

Oil laws, already favorable to exploration, moved a few steps closer to needed clarification with Resolution-Law No. 40 of July 8, 1958, which was published in the *Official Gazette* of July 21, 1958, and provides:

1. Special economic and fiscal incentives, granted under Law-Decree 1526 of July 8, 1954, have been extended to July 27, 1962. The period during which the incentives had been granted would otherwise have expired about mid-1958.

2. Duration of exploration concessions in force, July 21, 1956—whether in the first, second, or third year of their initial term—has been extended to July 27, 1962. Exploration concessions not in force as of July 21, 1958, continue to have a duration of three years.

3. Provincial governors no longer have the right to cancel applications for failure to file negligence letters; only the Minister of Agriculture now has this right. Also, once the first surface canon is paid, there will be no further need to file these letters.

NATIONAL FACTORS

Important national factors are believed to include the explosive political situation, al-

(continued)

though not to so great an extent as might generally be thought. The close economic ties between Cuba and the United States tend to push any governmental group in power towards holding a favorable attitude toward USA investment capital. More important, perhaps, has been the continuing need for government legislation which would clarify confusing points in existing oil laws.

During late 1958 and early 1959, the Batista regime was overthrown and the forces of Fidel Castro assumed control of the government. Fidel Castro had made statements favoring nationalization of key industries of Cuba; and, while these statements have been much modified of late, there remains considerable doubt about the treatment to be accorded investors and international concerns with operations in Cuba. END

DOMINICAN REPUBLIC

PHYSICAL DEVELOPMENT

EXPLORATION: Almost all desirable acreage is under concession to the William D. Pawley group (Petrolera Dominicana CA).

First deep test in the republic was spudded late in 1957 by H. S. Cole & Son, of Houston, Texas, as operators for a 2.1 million-acre farmout acquired from Petrolera Dominicana. Located in the Cibao valley near Villa Isabel, in the northern part of the country, the Cole wildcat was abandoned dry, at 10,800 ft, about mid-year 1958. Comet Drilling Co., Lafayette, La., was contractor. The operators are drilling a second test at an undisclosed site.

Azuana Petroleum drilled a dry test on another Petrolera Dominicana farmout, at Azua, in the southern part of the country. Reportedly, it had been projected to between 2,000 ft and 3,000 ft. Results are unknown.

Previous Work: In the Azua basin, several wells were drilled around an oil seep on the Higuerita dome in 1905, and oil was accumulated in Miocene rocks with sufficient permeability and in sufficient volume to blow out a well at a depth of 905 ft and flow for two weeks until the casing collapsed.

Several other wells drilled in the vicinity encountered numerous oil shows, some of which gave up small amounts of oil on test. In 1939, Seaboard Oil Co. produced about 40,000 bbl of oil from a well on the Maleno dome in the Azua basin from lenticular sands, reportedly of Lower Miocene age.

OIL LAWS*

Controlling Statutes Include:* Law 4532 on Exploitation and Exploration of Hydrocarbons. Includes concession application by William D. Pawley. Contract between government and William D. Pawley (Cia. Petrolera). Law 4532 Regulating The Exploration, Exploitation, and Processing by Private Parties of the Oil Deposits and Derivatives, Hydrocarbons, and Other Similar Combustibles.

NATIONAL FACTORS

Almost all desirable acreage is held by Petrolera Dominicana, a company in which William D. Pawley has controlling interest. His position as "exploration consultant" to the government also makes him extremely influential, and it is unlikely any acreage could be obtained except under terms of a farmout from Petrolera Dominicana.

The terms of farmouts are extremely complicated, according to reports, and they have discouraged operations by some major companies in the past. The petroleum law itself is of little consequence, being so lenient as to be unrealistic, and "too good to be true" from the operator's viewpoint. END

*Copies of these laws, with translation of the Law 4532 into English, are kept on file at the New York offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

DOMINICAN REPUBLIC — Oil Imports, 1957
(Thousands of Barrels)

From:	Gasoline	Kerosine	Residual Fuel Oils	Lubricating Oil	Other	Total
Canada	—	—	—	1	—	1
Mexico	—	—	56	—	—	56
Neth. Antilles	625	60	434	25	21	1,165
Puerto Rico	38	3	26	—	—	67
Trinidad	88	6	29	—	2	125
United States	41	2	20	47	10	120
Venezuela	—	—	761	—	134	899
Netherlands	—	—	2	1	—	3
United Kingdom	—	—	—	2	—	2
India	—	—	—	—	2	2
Indonesia	—	—	—	—	1	1
Total	792	71	1,328[1]	76	170	2,431

[1]Approximately 74% residual fuel oil.

Source: Commercio Exterior de la Republica Dominicana, Ciudad Trujillo, through US Department of State.

EL SALVADOR

PHYSICAL DEVELOPMENT

There is neither exploration, production, nor refining of petroleum in El Salvador.

MARKETING: Gulf Oil Corp. has purchased the former marketing facilities of Union Oil Co. of California in the Caribbean area.

Petroleum-product sales in El Salvador increased 62,000 bbl in 1957 compared with the previous year. Total for 1957 reached 1,287,000. Sales closely approximated import figures for the year (see table).

El Salvador increased imports of propane to 920,645 gal in 1957 from 774,340 in 1956. In 1957, 252,970 gal of propane were re-exported to Honduras.

OIL LAWS*

There is no petroleum law. The mining law is the Mining Code (not applicable to oil) of 1922, as amended by Decree 930 of January 21, 1953, which provides, among other things, for special legislative approval of petroleum contracts. Other applicable legislation is Decree 106 of July 23, 1937, as amended by Decree 65 of September 30, 1940, and Decree 100 of December 20, 1941, which provides for import exemptions for mining companies. A new Mining Department was created by Decree 2326 of February 5, 1957. Copies of all these laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Avenue, New York 20, N.Y. A new mining and oil law has been under consideration, but attempts to draft it have not been successful so far.

Oil marketing activities now are operated under concession contracts with the Ministry of Hacienda, and include tax exemption for necessary equipment along with free entry privileges. These concessions, however, are granted under general legislation rather than specific petroleum laws.

Under the current (1950) constitution, El Salvador claims territorial waters extending seaward for 200 marine miles, and presumably the government feels competent to grant concessions in that area. END

EL SALVADOR—Imports, 1957
(Thousands of Barrels)

From	Gasoline	Kerosine	Diesel Oil	Fuel Oil	Lubricants	Asphalt	Total
Netherlands Antilles	364	156	119	278	—	—	917
United States	217	17	19	53	26	2	334
Cuba	15	3	6	—	—	—	24
Venezuela	15	—	6	86	—	31	138
Total	611	176	150	417	26	33	1,413

Source: American Embassy, San Salvador, 1957, through the US Department of State.

*Translations of the complete text of oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

GUATAMALA

PHYSICAL DEVELOPMENT

BACKGROUND: Until 1955, Guatemala was closed to exploration by private companies due to restrictive legislation. Passage in that year of a new oil law (see *WPR—1958*) brought many companies in; and, with a controversy over taxes (see legal section herein) out of the way, exploration should pick up in 1959.

EXPLORATION: During 1958, two major USA oil companies were preparing for five early wildcats; and a Texas independent is to resume drilling, early in 1959, on the country's first wildcat, No. 1 Carlos Castillo Armas (see below). Four of the new tests, like the initial wildcat, will be drilled in Izabal province; the other on the southwest edge of the Peten.

To the end of 1958, no oil had been found, and no significant exploratory drilling had been done, since Guatemala's 1955 oil code went into effect. The oil operators have concentrated mostly on surface work, and will continue aerial mapping.

Drilling plans include: *Coastal Plains Oil Co.*: The Sloane Exploration Co. well, 1 Carlos Castillo Armas, was spudded in January 1958, 27 miles inland from Puertos Barrios, near the village of Bananera. In October 1957, Sloane merged with Coastal Plains Oil Co. of Guatemala SA, and operations were taken over by the new company. The well was abandoned after reaching a depth of 4,498 ft, without oil shows. Because of its adaptability to transportation by air, the rig was contracted to Guatemalan Atlantic Corp. to do core-hole drilling south of Laguna de Peten Itza. Coastal Plains plans early in 1959 to return and continue drilling the wildcat, where a gas show was found at 1,020 ft.

A 7,000-ft wildcat in Izabal was scheduled for spudding late in October 1958. The drill site is located along the Rio Dulce, 2.5 miles southeast of Livingston. The rig was to be barged to Livingston and then upstream on the Rio Dulce. Shallow at the mouth, this river is as much as 50 ft deep upstream—thus simplifying the problem of transporting the rig to the well site.

The Ohio Oil Co. of Guatemala: Ohio Oil's proposal for the first quarter of 1959 is to drill its No. 1 Chinaja to 13,500 ft, about 12 miles east of the Mexican border, on Right No. 2 which spreads from Peten into Alta Verapaz.

Inversiones Guatemaltecas Americanas (Inguam), backed by David C. Blintliff, of Houston, Texas: Inguam has contracted for three wildcats totaling 20,000 ft in the northern section of its Block 15, in Izabal. With Wilson Bros. Oil Co. of Dallas as contractor, work was to start early in 1959.

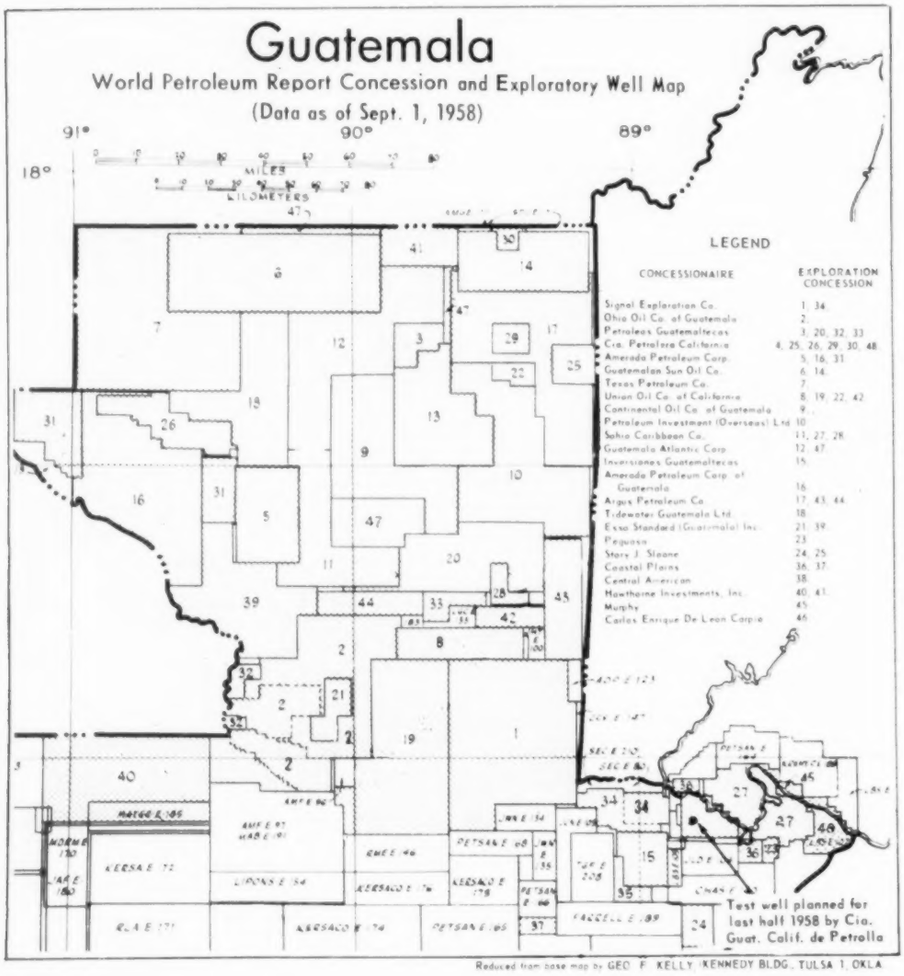
Esso Standard de Guatemala now estimates it will start drilling late in 1959. Roads and port facilities will first be built.

Other concessionaires have announced no plans for early drilling.

Exploration in Guatemala is tough, costly, and slow. With 39 geologists exploring in the northern part of the country, Guatemala was expected to spend about $15 million on oil search during 1958.

PRODUCTION, REFINING, MARKETING: There is no production, and no refineries exist at present. During 1958, the government gave permission to Breaux Bridge Oil Refining Co. to construct a 3,500 b/d plant. It will have a crude topping unit, a Unifiner, and a reforming unit. Completion is scheduled for mid-1960. The Shell group and the Canadian Eagle Oil Co. will participate, with common equity interest divided equally between Breaux Bridge and the Shell-Eagle interests.

The government is considering two other requests for similar permits—one by Litwin Engineering Co. and one by Ralph M. Parsons Co., of Los Angeles.


Guatemala
World Petroleum Report Concession and Exploratory Well Map
(Data as of Sept. 1, 1958)
91°
90°
89°
18°
MILES
KILOMETERS
LEGEND
CONCESSIONAIRE
EXPLORATION CONCESSION
Signal Exploration Co. 1, 34
Ohio Oil Co. of Guatemala 2
Petroleos Guatemaltecas 3, 20, 32, 33
Cia. Petrolera California 4, 25, 26, 29, 30, 48
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Sohio Caribbean Co. 11, 27, 28
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Argus Petroleum Co. 17, 43, 44
Tidewater Guatemala Ltd. 18
Esso Standard (Guatemala) Inc. 21, 39
Pequasa 23
Story J. Sloane 24, 25
Coastal Plains 36, 37
Central American 38
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Murphy 45
Carlos Enrique De Leon Carpio 46
Test well planned for last half 1958 by Cia. Guat. Calif. de Petrolio
Reduced from base map by GEO. F. KELLY, KENNEDY BLDG., TULSA 1, OKLA.

OIL LAWS*

Controlling Statues*: Oil exploration and development are governed by Decree 345 of July 7, 1955, and regulations thereto, published October 27, 1955; Decree 445.

A summary of the oil law is contained in *World Petroleum Report—1958*. For a more detailed resumé of the law, see the 1957 edition.

During 1958, a controversy arose which probably slowed exploration for a time. The Mining Department decided to disallow deduction of exploratory costs (which are very high in the Peten region) from payments on high surface rentals. The companies' understanding previous to their entry was that such costs would be offset against surface rentals. The controversy was settled, however, in favor of the companies when the responsible ministry (Hacienda) overruled the Mining Department on the matter.

*Translations of the complete text of all oil laws are kept on file at the office of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

NATIONAL FACTORS

On a net basis, the country is favorable to investment by international capital. As covered in more detail in previous editions, the **favorable factors** include: (1) no exchange control (the unit of currency, the quetzal, is exactly equivalent to the USA dollar); (2) government fiscal policies are generally conservative; (3) the political situation appears stable; (4) the government attitude toward international investors is favorable. **Unfavorable factors** include the high cost of operations due to rough inaccessible terrain and lack of trained labor, but these are faced in most isolated operations outside the United States. Income tax is a maximum 43% on expenditures of $300,000 or over.

The government of President Miguel Ydigoras Fuentes, elected in early 1958, has been under attack from both the left and right wings. The right charges that communist influence is growing again due to lack of government control; but this appears unfounded, since the degree of communist influence decreased recently with the election of moderate noncommunist leftists to the leadership of the Left Wing Revolutionary Party.

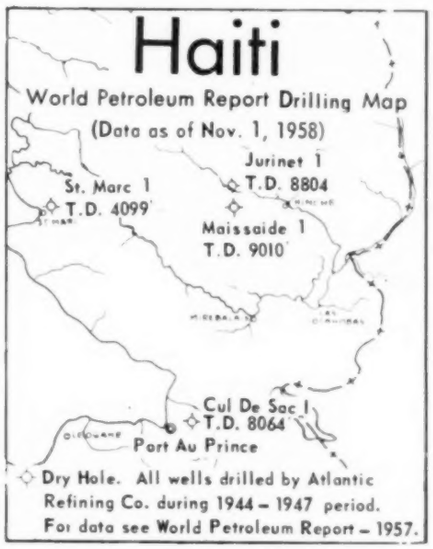
END

HAITI

PHYSICAL DEVELOPMENT

EXPLORATION: Seven exploratory wells had been drilled and one was drilling by the end of 1958. Four of the seven wells were drilled by The Atlantic Refining Co. (see map), and three by a combine of M. E. Andrews, Commonwealth Oil, and John W. Mecom. All were dry; for a description, see *World Petroleum Report—1957*. During November 1958, a well was spudded by Commonwealth Oil Co., of Houston, in the Cul de Sac basin. It will explore the Miocene to about 7,000 ft.

Commonwealth holds six concessions in Haiti. During November 1958, it was announced that Chas. Holliman, of Dallas, Texas, had been granted a concession between latitudes of 18° 30' and 19° 30'. Reportedly, two other applications were rejected, one from Haitex Oil Co. and one by a John Heyman.


Haiti
World Petroleum Report Drilling Map
(Data as of Nov. 1, 1958)
Jurinet 1
T.D. 8804
St. Marc 1
T.D. 4099'
Maissaide 1
T.D. 9010'
Cul De Sac 1
T.D. 8064'
Port Au Prince
Dry Hole. All wells drilled by Atlantic Refining Co. during 1944 – 1947 period.
For data see World Petroleum Report – 1957.

Geology: Structurally, Haiti is complex. There exist thick sections of marine sediments, however, with a structure favorable to oil accumulation. There are oil seeps in the Cul de Sac basin of the Dominican Republic, about five miles away, and some shows of oil or gas have been encountered in the deep wells drilled by Atlantic. For a review of geology, see *World Oil*, September 1958, and *Petroleo Interamericano*, September 1958.

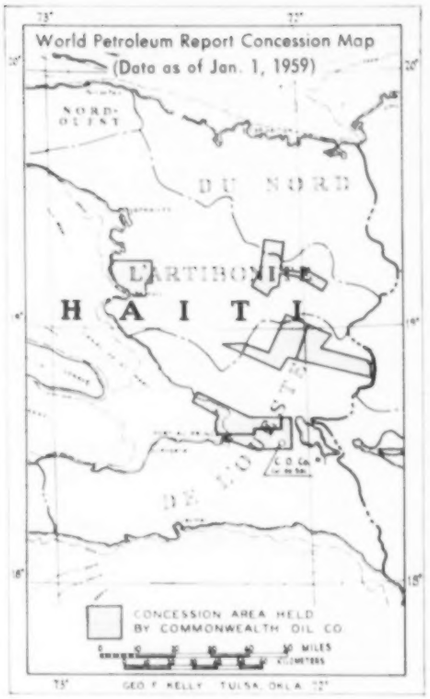
PRODUCTION, REFINING, MARKETING: There is no production or refining. Consumption needs are very small, probably less than 2,000 b/d, and all imported.

OIL LAWS*

For resumés of the Mining Law of December 20, 1943 (Decree Law 337) and terms of the concession held in Haiti by Commonwealth, see *World Petroleum Report—1957*. Provisions of the recent Holliman concession follow:

SUMMARY OF HOLLIMAN CONCESSION

The concession was granted by presidential decree under powers vested in the chief executive under the law of July 31, 1958. **Duration:** 18 months. **Exploration:** Must start within 30 days. **Production:** If oil is discovered, 40% of the crude oil becomes the government's share, 40% the concessionaire's, and 20% goes to the company in charge of the operation. **Performance Bond:** Concession holder must deposit a performance bond of $20,000.


World Petroleum Report Concession Map
(Data as of Jan. 1, 1959)
NORD-OUEST
DU NORD
L'ARTIBONITE
H A I T I
CONCESSION AREA HELD BY COMMONWEALTH OIL CO.
GEO. F. KELLY TULSA, OKLA.

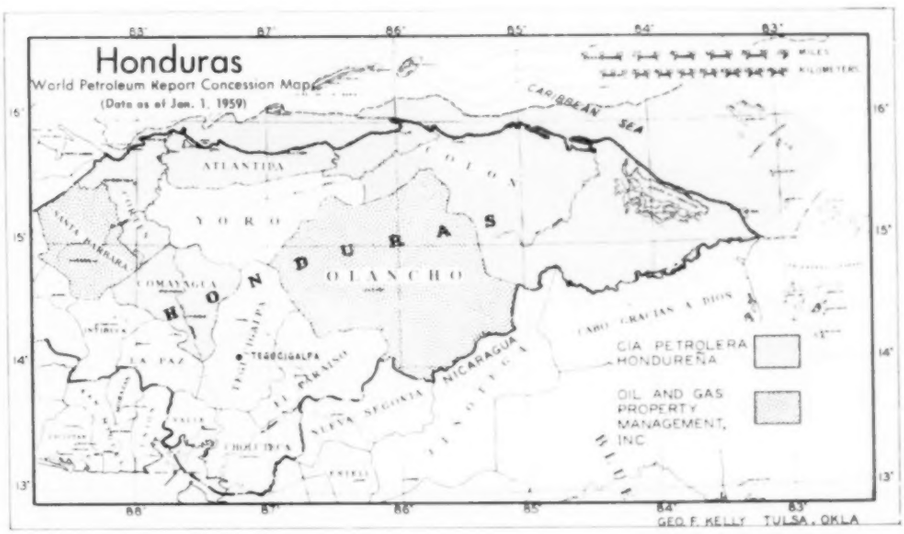
NATIONAL FACTORS

For a review of the factors influencing investment favorability, see *World Petroleum Report—1957*. Briefly, **favorable factors** include: (1) favorable governmental attitude; (2) no exchange control (the gourde is equivalent to 20 US cents); (3) income tax, maximum 30%; (4) good investment history, with no expropriations since 1915. **Unfavorable factors** include extreme political instability, which has retarded exploration in the past.

*A new oil law was proposed in 1958, but not passed.

END

HONDURAS



PHYSICAL DEVELOPMENT

EXPLORATION: No change occurred in concession holdings during 1958. Cia. Petrolera Hondureña holds all the coastal states plus Bay Island, continental shelf tidelands and adjoining waters (see map, p. 69, of *World Petroleum Report—1958* for concessions and wells drilled). Petroleos Hondureños SA has concessions covering Santa Barbara and Olancho provinces. The group of independents participating is listed in *WPR-1958*.

Little exploratory drilling has been done. Cia. Petrolera drilled a dry wildcat in 1957 near the Laguna de Caratasca, and was planning two deep tests (as described in *WPR—1958*). Other drilling has been very minor. In *WPR—1957*, it was reported that Anglo Persian Oil Co. had drilled, but this was denied by the company. J. V. Harrison, former APOC geologist in Honduras in the early 1920's, stated his company did no drilling there; that two very shallow holes (about 400-ft) were drilled by Honduras Petroleum Co., a small concern, in the

(*continued*)

HONDURAS ***(continued)***

north without success. An individual named Miller spudded one well in the Juticalpa area about 1921 purely to retain his concession, but it went down no more than 20 ft.

PRODUCING, REFINING, MARKETING: There is no crude-oil production in the country. In September 1958, International Industries Inc. (a New Jersey corporation) signed a contract with the government for a 15,000 b/d refinery in the Gulf of Fonseca area. Pipeline and other facilities would raise the cost to $15 million to $20 million. For a 24-month completion, construction would start within nine months of congressional approval. Company spokesman said that, while the plant will not be a monopoly, it will be afforded "adequate protection" by the government.

Only sizable marketing companies in the country are Texaco and Esso. Both are reported planning enlargement and improvement of their petroleum handling and storage facilities, and both contemplate new construction in the Puerto Cortes area.

Consumption in Honduras in 1958 was estimated at 3,100 b/d (crude-equivalent basis), 4.6% over 1957.

OIL LAWS*

At last report, the oil law had not been passed. The law passed January 11, 1958 (dated October 16, 1957) was declared void because the December 21, 1957, constitution was already in effect and the junta lacked power to enact laws after the new constitution. The government submitted to the congress, which in turn sent it to committee, a draft oil law. It is nearly identical to the January law, but reportedly now contains guarantee of conversion from exploration concession to exploitation. No further changes are known. No date has been set for the law's final consideration by the congress. When the final text has been passed, a translation will be maintained on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Avenue, New York 20, N.Y. (see p. 22 herein).

*Translations of the complete text of all oil laws are kept on file at the offices of *World Petroleum Report Legislation*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

NATIONAL FACTORS

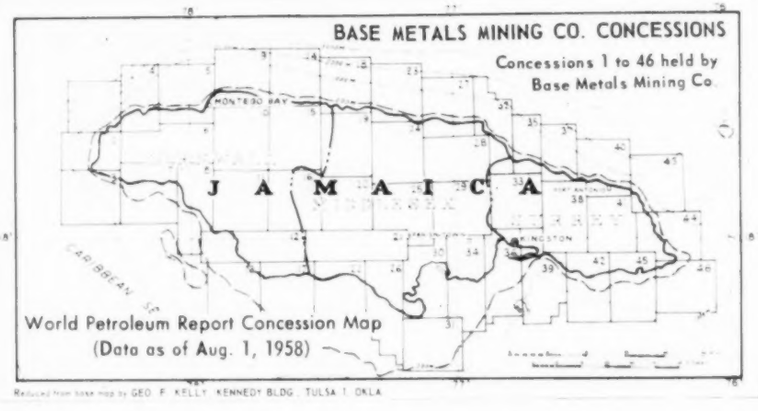
There has been little change in the factors affecting investment listed in *WPR—1957*. Income tax remains at 30% maximum. The currency unit, the lempira, remains at US 49½ cents. There are no exchange restrictions or control. There are no known instances of expropriation, nor restrictions on foreign investment other than as listed in *WPR—1957*, and these do not affect petroleum. An MSA guarantee with the USA against expropriation and guaranteeing convertibility is available. END

JAMAICA

PHYSICAL DEVELOPMENT

EXPLORATION: The only recent exploration has been by a subsidiary of Standard Oil Co. (Indiana), Pan American Petroleum Corp.; but it gave up its prospecting licenses on the island early in 1958. A company subsidiary, Pan Jamaican Oil Co., had taken over the Jamaican licenses in early 1956 from Base Metals Mining Corp., and drilled three unsuccessful exploratory tests onshore (see map). Base Metals is retaining the licenses, and has indicated it will continue exploration.

PRODUCTION, REFINING, MARKETING: There is no domestic production in Jamaica. During 1958, a newly formed company, Jamaica Oil & Chemical Co. Ltd., announced it would build a plant, with an initial capacity of 16,500 b/d, near Kingston. Trinidad, which supplies most of Jamaica's demand at present, has announced it will oppose the new refinery in the new West Indian Federation parliament. This, plus opposition of other companies, appears to have killed the plan.


BASE METALS MINING CO. CONCESSIONS
Concessions 1 to 46 held by Base Metals Mining Co.
J A M A I C A
KINGSTON
CARIBBEAN SEA
World Petroleum Report Concession Map
(Data as of Aug. 1, 1958)
Reduced from base map by GEO. F. KELLY, KENNEDY BLDG., TULSA 1, OKLA.

*OIL LAW SUMMARY**†*

Governing legislation is consolidated in the Petroleum (Production) Law (Chap. 292) of 1940, amended by Law 10 of 1955; Regulations of 1950, 1954, and 1955.

EXPLORATION: First stage covered by oil exploration license. **Minimum Area:** 8 square miles. No maximum. **License Fee:** £50 for every 1,000 square miles; maximum fee, £1,000. Licensee may obtain oil prospecting license; area not more than 200 square miles. Under oil prospecting license, **annual rent** during the initial term is 5 shillings, and each renewal 10 shillings for each square mile.

Royalty: On crude, 4 shillings per long ton; on natural gas, two pence per thousand cubic feet sold. From royalties, rentals are deductible. **Surrender:** Any time on three months' notice. **Conversion:** Licensee has right to an oil mining lease not exceeding one-half the prospecting license area.

EXPLOITATION: Lease is granted only on area of former prospecting license. Applicant must make a topographic survey. **Area:** Maximum 100 square miles. **Yearly Rental:** In first, second, and third years, one shilling per acre—rising to six shillings in 10th and subsequent years. **Royalty:** On crude, maximum 12½% of value, not less than two shillings and sixpence per ton. On casinghead, maximum 10% of value up to two Imperial gallons per thousand cubic feet of gas treated. On gas, two pence per thousand cubic feet sold. Rent paid is deductible. Lease must contain clause for periodic revision of royalties.

* Copies of oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

† *Source:* Summary by Samuel Hart; Manron & Hart, Solicitors, 71 Barry St., Kingston, Jamaica.

NATIONAL FACTORS

The governmental attitude is favorable, and considerable encouragement is given new industries in the form of tax incentives, etc. A Jamaican delegation from the government was recently in Washington to negotiate loans, and representatives at that time estimated $50 million to $100 million in new capital would be necessary to finance new industries to keep ahead of the rapidly growing population. The principal lack is of energy sources, without which development must be limited, and this further improves the attitude toward oil investment.

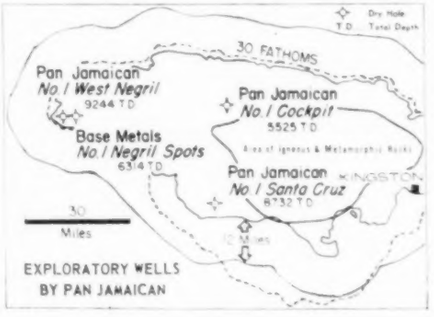
The unit of currency is the pound sterling, valued at $2.80. Income tax on corporations is 8 shillings ($1.12), or 40%, per Jamaican pound ($2.80) of the net or chargeable income. This includes the income tax of 7s.6d. ($1.05) per pound, or 35%, plus a "company profits tax" of 5%.

There is a seven-year tax exemption on new industry, from the date of initial production, for foreign companies. Losses may be carried forward six years. International companies established in Jamaica which do not carry on trade in the British West Indies receive 100% tax relief. Depreciation allowances vary according to type and life of item, with the average rate for machinery and equipment 10% annually. END

JAMAICA—Drilling, 1956-57

Operator	Well Name	Well Location	Completion Date (1957)	T.D. (Feet)	Deepest Formation
Pan Jamaican Oil Co.	Santa Cruz—1	Lat. 17° 55' 10" N. Long. 77° 44' 19" W.	March	8,732	Cretaceous volcanics; no significant shows.
Pan Jamaican Oil Co.	Cockpit—1	Lat. 18° 15' 27" N. Long. 77° 38' 33" W.	May	5,525	Cretaceous volcanics; no significant shows.
Pan Jamaican Oil Co.	West Negril—1	Lat. 18° 14' 51" N. Long. 78° 19' 03" W.	August	9,244	Cretaceous volcanics; no significant shows.

Source: Bull. Am. Assn. Petroleum Geologists.



MEXICO

PHYSICAL DEVELOPMENT

EXPLORATION: Two new oil fields and a gas field were discovered during the first half of 1958. The oil fields are Xiliapa in Poza Rica and Mecoacan in the Isthmus areas; the gas field is Santa Anita in the northeast zone.

During 1958, Petroleos Mexicanos drilled total 379 wells, as follows:

	Wildcats	*Development*	*Total*
Dry holes	59	32	91
Gas producers	7	29	36
Oil producers	10	242	252
Total	76	303	379

As of June 30, 1958, there were 120 rigs in operation throughout the country, of which 98 were owned by Pemex. Of these, 42 were in Poza Rica and the new Golden Lane area for development drilling. An additional 53 rigs were on service and workover operations. There were 50 exploration crews at work during the first six months of 1958, compared with 46 during 1957.

MEXICO — Wells Drilled by Pemex

Year	Wildcats	Development	Total Wells	Footage Drilled
1938	5	12	17	54,115
1939	1	25	26	105,454
1940	0	25	25	100,055
1941	1	20	21	73,202
1942	3	12	15	55,777
1943	4	17	21	97,873
1944	4	30	34	155,402
1945	8	42	50	237,171
1946	11	38	49	252,099
1947	16	35	51	296,129
1948	26	56	82	431,147
1949	33	129	162	670,180
1950	33	185	218	890,292
1951	72	196	268	1,095,688
1952	57	250	307	1,223,480
1953	89	266	355	1,520,348
1954	81	212	293	1,550,449
1955	74	256	330	1,789,807
1956	93	309	402	2,173,256
1957	108	281	389	2,514,165
1958 to Sept 30	59	241	300	2,076,348

Activities centered largely along the Mexican Gulf Coast, including exploration on the continental shelf—comprising marine seismic surveys off the shore of Veracruz between Tecolutla and Cabo Rojo, and off the coast of Tabasco. Some offshore drilling was done east of Coatzacoalcos, mainly by an international group which held special contracts with Pemex. The group includes Edwin W. Pauley, Mexofina SA (formerly, but no longer, an affiliate of Belgium's Petrofina), and American Independent Oil Co. Another firm, Sharmex SA, an affiliate of Sharples Oil Co. of Denver, has been drilling without commercial success offshore in the Tamiahua lagoon, in northern Veracruz, just south of Tampico.

According to the Pauley company, first offshore oil field was brought in near Coatzacoalcos.

Late in 1958, a modest gas discovery was made in Mexico's first offshore field in the Bay of Campeche, off the Isthmus of Tehuantepec, at the southernmost point in the Mexican Gulf.

Drillers found 100 ft of oil and gas sand at 3,120 ft, working in a 50-ft depth of water. The well, now shut in, tested one million cubic feet per day of gas at 900 psi flowing pressure through a $\frac{3}{8}$-in. choke. The well was the first success after four dry holes in the area. A sixth well has now been spudded, 10 miles west of the gasser.

PRODUCTION: During 1958, crude-oil production showed about a 6% increase over the previous year's average: 264,940 b/d as against 252,595 b/d.

In natural gasoline, production figures were available only for the year 1957, which showed a 13% gain over the previous year. Natural gas had increased during the first half of 1958. By May, daily average production had hit 700 million cubic feet per day, compared with the 1957 average of 449 million.

MEXICO—Crude-Oil Production, 1958

(Barrels Per Day)

January	260,100	July	254,000
February	262,300	August	263,000
March	264,200	September	269,000
April	268,800	October	269,000
May	266,700	November	270,000*
June	261,200	December	271,000*

Year (1958) 264,940 b/d

* Estimated.

REFINING: At the end of the first half of 1958, crude charging capacity of Mexico's refineries was 322,000 b/d, but it was headed for a fairly sizable expansion. An accompanying table summarizes crude runs to stills and output of the principal products. The new construction under way is aimed primarily at boosting yields of distillates and reducing production of fuel oil.

Additions at the 100,000 b/d Atzcapotzalco refinery in Mexico City will consist mainly of a 55,000 b/d vacuum still; a new model IV fluid cat-cracker with a capacity of 25,000 b/d; a feed preparation unit; fractionation, polymerization, and alklyation facilities; and a 30-ton-per-day sulfur-recovery plant.

A $40 million modernization of the 75,000 b/d Madero refinery includes two new 50,000 b/d topping units, currently under construction, a 30,000 b/d cat-cracker, and the necessary feed preparation, gas fractionation, and polymerization units.

MEXICO — Refining in 1958

(Barrels Per Day, 1st 9 Months)

Crude runs to stills	259,400
Principal products:	
Gasoline	64,410
Kerosine	26,442
Diesel fuel	26,600
Fuel oil	123,860
Lube oils	2,386

At the 50,000 b/d Minatitlan refinery, new lube-oil refining facilities of 1,000 b/d capacity were due for completion by the end of 1958. Further in the future are plans for a new fractionator and a catalytic reformer.

TRANSPORTATION: The principal pipeline project is a 24-in. natural-gas line of 300 million cubic feet per day capacity to run the 490 miles from the Jose Colomo field in Tabasco to Mexico City. It will cost about $43 million.

EXPORTS AND IMPORTS: Crude imports in 1957 totaled 1,433,814 bbl, of which 940,579 came from the United States and the balance from Venezuela. Product imports during that year were 17,605,912 bbl.

During the first six months of 1958, Mexico's imports averaged only 18,500 b/d. As of October 1, 1958, the refinery output was more than consumption, and the country began to export products in excess of its imports. However, Mexico found it necessary to import products to reach markets in certain areas which could not be supplied economically with domestic refinery output.

In the first three months of 1958, products valued at $13.76 million were imported. By comparison, 1957's product imports were valued at about $70 million.

Crude exports in 1957 were about 16 million barrels, including fuel oil. Product exports that year totaled 786,030 bbl, plus 1,059,265 bbl of bunker oil. Total domestic consumption in 1957 was 92,085,275 bbl, an average of 352,286 b/d.

During the first six months of 1958, Mexico sent 24.2 billion cubic feet of natural gas to the USA under a contract with the Texas Eastern Gas Transmission Corp., by which gas had started flowing to USA markets in September of 1957.

Late in 1958, following the elections, Pemex boosted prices on its two top-grade gasolines. Premium fuel, with an octane rating of about 90, was raised to 32¢ per gal; and the medium-grade went up to 25.6¢. The lowest-grade motor fuel remained at 17.6¢ per gal.

OIL LAWS*

Shortly before the boost in gasoline prices, the Mexican senate had passed a new administration bill to cancel all outstanding concessions to private interests for production, refining, and distribution of oil or gas, thus completing the government's monopoly of the industry. Only a fee basis is to be used in future contracts. Existing percentage contracts will be honored, however, but not extended, The act also reiterated that Pemex is in exclusive control of petrochemicals. Because of the government company's plans to continue exploration and production of crude, no large-scale entry into the petrochemicals industry is foreseen.

*Copies of all oil laws, including those prior to nationalization and those recently enacted, are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., N.Y. 20, N.Y. (see p. 22 herein).

NATIONAL FACTORS

The most significant problem facing the country's nationalized oil industry as it entered its 21st year of existence remained its need for more working capital. Although praise of Pemex accomplishments ran high during the 20th anniversary celebrations in 1958, signs continued that all was not so rosy as proponents of the expropriation policy had contended. Much more exploratory drilling is needed. Also, the financial picture of Pemex is not clear. There has been no balance sheet made public since 1947; Pemex officials argue that finances "are none of the people's business." The monopoly has two major obstacles which are typical of many nationalized industries: a moral obligation to try to keep the prices of products down, and problems in labor relations.

During late 1958, the new president of Mexico installed a new head of Pemex, Pascual Gutierrez Roldan, replacing Senator Bermudez who had capably filled the post for many years. No changes in Pemex's basic policies are expected.

END

NETHERLANDS WEST INDIES

PHYSICAL DEVELOPMENT

EXPLORATION: Superficial studies indicate Aruba's southwestern coast may have oil potential, and plans for exploration are under way for 1959. There is no oil production now.

REFINING: Refining comprises the main life of the islands of Aruba and Curacao, and the two principal refineries are owned by Jersey Standard and Shell (see *WPR—1957*). At the end of 1957, a new US $4,200,000 distillate-upgrading unit (Edeleanu plant) went onstream at the Lago refinery as an addition to the two similar plants already in operation. It is designed to produce 20,000 b/d of middle distillates.

Lago will expend US $18 million to revamp four (of the present 18) crude-processing units over a period of three years. The completed project will permit Lago to maintain its present crude-running capacity at lower cost, resulting from reduced maintenance and decreased manpower requirements.

By a "gentlemen's agreement" with Venezuela, the Lago refinery is limited to annual crude runs averaging no higher than 440,000 b/d, although its estimated total capacity for short periods is 600,000 b/d. Lago executives, during informal discussions, have expressed confidence in the refinery's potential ability to operate economically by importing crude oil from sources outside Venezuela, should such a step become necessary. However, Lago would, of course, much prefer to continue indefinitely its present agreement with Venezuela, and expects to be able to do so for the forseeable future.

Lago Oil crude runs were 420,319 b/d during 1957—a drop of 6.84% from 451,166 b/d in 1956. Product shipments were 388,831 b/d in 1957—a drop of 8.95%. Shipments do not include local sales, ships' bunkers, or process fuel.

Crude runs by Lago came to 462,418 b/d in the first half of 1958, down 8.74% from the same period in 1957. Exports of products came to 71,347,880 bbl in the first half of 1958, down 6.23% from the 76,084,503 bbl in the same period in 1957.

NATIONAL FACTORS

The investment climate is good, and the government attitude very favorable. Since the Netherlands Antilles obtained full autonomy as a co-partner in the Kingdom of the Netherlands in 1954, the government has launched a very successful development program with inducements to investment. These inducements include a 10-year tax holiday, exemption from profits tax, no import duties, no restrictions on foreign ownership or foreign employment, and guarantees against expropriation or nationalization. A treaty with the USA eliminates double taxation. There is no exchange control, with the guilder a "hard currency" fixed at 1.885 per US dollar. The history of Lago's and Shell's relations with the government is long and peaceful. END

NICARAGUA

PHYSICAL DEVELOPMENT

EXPLORATION: Exploration in the country received a setback, from which it has not as yet recovered, when the offshore well described in *WPR- 1958* came in dry. The wildcat was situated on the eastern edge of Flag Reef, adjacent to Miskite Cay and approximately 35 miles northeast of Puerto Cabezas. The well reached a total depth of 14,498 ft, and has been abandoned. It is reported the well bottomed in Tertiary sediments, and that high-pressure gas shows were encountered between 13,000 ft and 14,000 ft. The company had planned more wells, but the results of the first were enough. Gulf Oil surrendered its interest in the Miguel d'Escoto concession, and no activity is known to be going on now.

PRODUCTION, REFINING, MARKETING: There is no production or refining. Information on marketing is hard to get. The most recent figures available are those given in the accompanying table, indicating a use of about 2,630 b/d in 1956

NICARAGUA—Imports, 1956

(Thousands of Barrels)

From	Gasoline	Kerosine	Gas, diesel, and other fuel oils	Lubricating oils	Other	Total
Netherlands Antilles	427	116	343	—	—	886
United States	3	1	13	24	6	47
Panama	2	3	19	—	—	24
Venezuela	7	—	—	—	16	23
Total	439	120	375	24	22	980

Source: Memoria de la Recaudacion General de Aduanas, 1956. Managua, through the US Department of State.

OIL LAWS

On December 3, 1958, a new oil law was finally passed. It is known as Decree 372, Special Law on the Exploration and Exploitation of Petroleum*.

Contents of this law are given in the accompanying summary. The only concession contract formally let, so far as is known, is the Miguel d'Escoto concession of 1935. It is summarized in *World Petroleum Report—1957*.

*An English translation of the law is kept on file at offices of *World Petroleum Legislation Report*, 604 Fifth Avenue, New York 20, N.Y. (see p. 22 herein).

OIL LAW SUMMARY

All subsoil State property. Country divided into four zones—Pacific, Central, Atlantic, Continental Shelf.

RECONNAISSANCE: Freely done under special permit. No fees payable.

EXPLORATION: Duration: 3 years. Renewable for 3 years. **Area:** 370,500 acres in Pacific zone, 741,000 acres in Central, 494,000 acres in Atlantic, 741,000 acres on continental shelf (Pacific side)—988,000 acres (Atlantic side). **Maximum per concessionaire,** three times maximum concession area. **Bond:** 40 US cents per hectare in Pacific zone, 15 US cents Central, 30 US cents Atlantic, 25 US cents on continental shelf. **Minimum Investment** (US cents per acre): Pacific, 16; Central, 6; Atlantic, 12; continental shelf, 10. **Annual Exploration Tax** (US cents per hectare): Pacific, 5; Central, 0.2; Atlantic, 4; continental shelf, 3. During extension, rates raised US two cents per hectare.

EXPLOITATION: Conversion guaranteed if commercial discovery made. Equivalent amount to exploitation area must be returned. If no discovery made, conversion may be done with return of 50% exploration area to govt. **Drilling Obligation:** 5,000 meters per 247,000 acres concession area during first seven years; 10,000, meters (in two or more wells) per 49,400 acres during following eight years. **Area:** Maximum 50% exploration area, selected by concessionaire. Maximum per concession, 61,750 acres. Maximum per concessionaire, from 225,000 hectares Pacific zone to 600,000 hectares on continental shelf. **Duration:** 40 years. Extendible 20 years. **Initial Exploitation Tax** (Payable once): Pacific, 20 US cents per hectare; Central, 8; Atlantic, 12; continental shelf, 10. **Annual Surface Tax** (US cents per acre): From first year graduated up to 40th year: Pacific 6-20; Central, 2-20; Atlantic, 4-20; continental shelf, 4-20. **Royalty:** 10% on 5,000 b/d, graduating to 16 2/3% on 15,000 b/d and up. Gas, 11.5%. **Income Tax:** Subject to general tax (maximum now at 18%). **Depletion Allowance:** 27.5% gross less royalty, up to 50% of net. Maximum all payments to government, 50%.

REFINING AND TRANSPORTATION: 40-year concession granted to exploitation concessionaire on request. Must begin operations within one year. Must transport compatible oils belonging to third parties or government on request. Refining concessions, subject to tax equivalent to 50% of taxes which would have been levied on equivalent imported products. Transportation concessionaires pay 2% tax on amounts received for third parties' oil.

NATIONAL FACTORS

The national factors affecting investment are described in *World Petroleum Report—1957*. Briefly, they include good political stability, unrestricted repatriation of capital and profits, workable labor legislation. Income-tax maximum is 18%. END

PANAMA

PHYSICAL DEVELOPMENT

EXPLORATION: No production has been found, although some previous exploration has been done (see *World Petroleum Report—1957 and 1958*). Panama's first offshore, and its deepest, well was abandoned in 1958. Anita Bay No. 1-8, on the north coast of Panama, was drilled by three USA independents. Champlin Oil & Refining Co., Forth Worth, Texas, is operator with 50% interest. Kerr-McGee Oil Industries Inc. and Southland Royalty Co. each has a quarter-interest. Anita Bay No. 1-8 was drilled and abandoned at a total depth of 9,537 ft. Only one slight oil show was encountered in a fossiliferous lime section from 7,140 ft to 7,510 ft. No drill-stem tests were made. The test was bottomed in beds of Oligocene or older. It was drilled in Chiriqui Lagoon, Lat 9° 0′ 58″ N Long 81° 54′ 30″ W. Champlin drilled approximately 35 miles westward, and located Almirante No. 1 at Lat 9° 16′ 58″ N Long 82° 21′ 23″ W. Almirante No. 1 was bottomed at 6,678 ft, with no shows of oil. No further drilling is to be done until a comprehensive study of geological data has been undertaken.

The only other concessionaire with announced drilling plans is Delhi-Taylor Oil Corp., which has begun a five-year $5.5 million core-drilling program on its Darien concession, acquired from International Oil and Metals during 1958 in exchange for an overriding royalty of 1.5%. The first deep test was to begin during February 1959 in the Chucunaque River basin, according to the company.

PRODUCTION & REFINING: There is no production, and there are no refineries as yet, although plans for two major plants have been announced (see *WPR—1957*). Companies involved are Panama Refining & Petrochemical, headed by East Coast investors; and Panama Refining Inc., headed by D. K. Ludwig, a tanker operator. The capacities of the plants are to be 55,000 b/d and 70,000 b/d, respectively. During 1958, Golden Eagle Refining Co. purchased the 6,500 b/d refinery of Sunset International Petroleum Corp. at Beverly Hills, Calif. Golden Eagle is a subsidiary of Panama Refining and Petrochemical Co.

PANAMA—Commerce in Petroleum*
(First Quarter 1958)

IMPORTS Products:	GALLONS	VALUE (BALBOAS†)
Motor gasoline	7,478,767	786,331
Aviation gasoline	2,475,000	427,000
Kerosine and lighting fuel	2,417,904	225,732
Fuel oil	8,912,100	523,735
Diesel oil	4,231,686	387,253
Other liquid fuels	13	47
Lubricating oils	348,571	194,926
RE-EXPORTS Products:		
Motor gasoline	7,722	2,198
Diesel oil	21,220	3,656
Lubricating oils	17,047	1,867

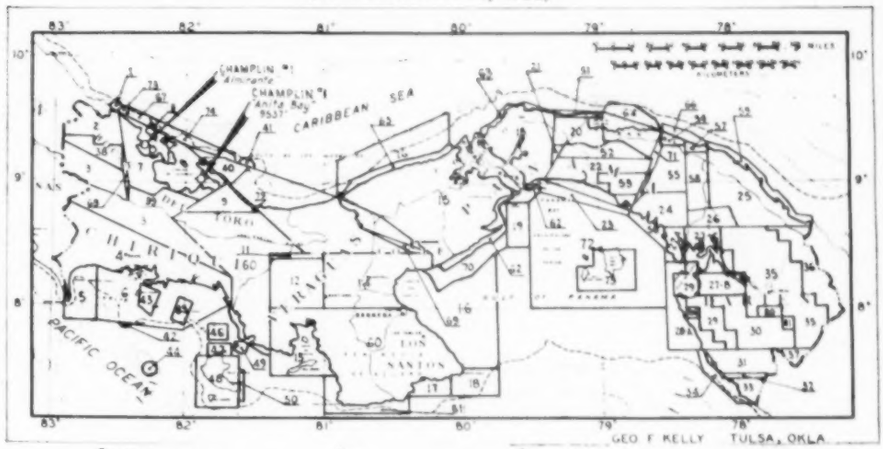
*Includes liquid products only.
†One balboa equals US $1.00.

PANAMA—Imports, 1957*
(Thousands of Barrels)

	Gasoline	Kerosine	Diesel Oil	Residual Fuel Oil	Lubricating Oil	Total
Canal Zone	792	189	247	654	—	1,882
Colon Free Zone	—	—	—	—	5	5
Curacao	—	—	138	—	1	139
United States	1	—	—	—	17	18
Total	793	189	385	654	23	2,044

*Preliminary.
Source: Department of Statistics and Census, Panama, through US Department of State.

Panama
World Petroleum Report Concession Map
(Data as of Nov. 14, 1958)



GEO. F. KELLY TULSA, OKLA.

Concessionaire	Area
TRADEWINDS EXPLORATION OF PANAMA S.A.	1,8,10,31,32
UNION OIL CO. OF CALIFORNIA y CARIBBEAN GULF OIL CO.	2
CORPORACION HEMISFERICA DE GAS y PETROLEO S.A.	3
CIA. PETROLERA CHIRICANA S.A.	4
CIA. BURICA S.A. (pending)	5
PANAMA OIL R F O S.A. (pending)	6,16
CHAMPLIN OIL REFINING CO.	7
JERONIMO ALMILLATEGUI (pending)	9
DOUGLAS E. JONES (pending)	11
E. RAYMOND MOSS (pending)	12
JOSE A. SOSSA y SATURNINO FLORES	13,17
CIA. PETROLERA ISTMENA S.A.	14
CIA. PETROLERA DEL GOLFO DE SAN MIGUEL	15A
CIA. PETROLERA DEL GOLFO DE SAN MIGUEL S.A.	15B
JUAN DE DIOS POVEDA (pending)	18
CIA. PETROLERA CHIMAN S.A.	19,23,24,56,73,74,76
PAN AMERICAN PETROLEUM CORP. (pending)	20
FELIPE BARRIA	21
CORPORACION PETROLERA S.A.	22

Concessionaire	Area
SOSSA PETROLEUM S.A.	25,33,37,
ALMILLATEGUI, SOSSA y FLORES	26,55,58,
CIA. PETROLERA BALBOA S.A.	27A,27B,28A,30,36,
CIA. PETROLERA COCLE S.A.	27C,28B,
PANAMANIAN DELHI PETROLERA, INC.	29,35,
ROBERT D'ORSAY	34,41,42,44,49,51,
NELSON BARRAGAN	38
EDUARDO A. CHIARI	39,52,53,
TEXAS AMERICAN PETROLEO DE PANAMA S.A.	40
HORACIO VALARDE	43,45,46,47,48,50,59,
FRANCISCO MARTINELLI, JR.	54,57,70,
EASTERN STATE PETROLEUM CORP. OF PANAMA S.A.	60,63,
JUAN AYALA E.	61,66,69,71,
CIA. PETROLERA TABOGA S.A.	62,64,65,
JORGE FABREGA P.	67,68,
JULIO HEURTEMATTE	72,
AGUSTIN DONDERIS VERDOY	75,
CARLOS E. BIERBARACH	77,
PEDRO MOSCOSO	78,79,

MARKETING: All consumption is imported. There are also some small amounts of re-exports.

Gulf Petroleum SA has announced acquisition of Union Oil Co. of California's marketing outlets in Panama and the Panama Canal Zone.

OIL LAWS*

Oil laws are currently being revised with the aid of an advisor from the United States, E. Batzell, of Washington, D.C. For a resume of the 1953 law (which governs operations at present), see *World Petroleum Report—1957*. (A translation of this law is kept on file at the New York offices of *World Petroleum Legislation Report*.) It should be borne in mind, however, that other requirements than those in the 1953 law would undoubtedly be imposed on new concessions, pending formulation and passage of the proposed law.

*Translations of the complete text of all oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

NATIONAL FACTORS

On net evaluation, the investment climate in Panama is good. **Favorable factors** include a friendly governmental attitude, incentives to new investment in the form of tax exemption, political stability, no expropriations recorded, and no exchange control (the unit of currency, the balboa, is equivalent to the US dollar). For discussion, see *WPR—1957*.

The **unfavorable features** are chiefly those imposed by nature: the difficult climate and terrain, with geology only moderately encouraging.

END

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PUERTO RICO

PHYSICAL DEVELOPMENT

EXPLORATION: As shown on the accompanying map, several new concessions were obtained in 1958. Maritime Oil Co., an oil marketing company of 2121 Semmes St. in Houston, Texas, plans a well early in 1959. Activities thus far consisted of a review of available information. A concession is held at Ponce by Esteban Vidal, a Puerto Rican. Allas Tair Frazer, an individual with mining interests in Jamaica, has started preliminary work. Cataract Mining Corp. also has acreage. A concession was reportedly granted in 1958 to William S. Wallis, of Toronto, Canada, and F. H. Crerie, of Houston, Texas.

PRODUCTION AND TRANSPORTATION: There is no production, and there are no crude pipelines.

REFINING: Commonwealth Oil Refining Co. is again enlarging its Guayanilla Bay refinery. Another 11,000 b/d will raise capacity to 75,000 b/d. The island's second plant at San Juan is rated at 13,500 b/d. It is operated by Caribbean Refining Co. Both plants operate on Venezuelan crude. Caribbean's plant includes 13,100 b/d fluid catalytic cracking capacity, with 9,000 vis-breaking and 500 polymerization capacity. The Commonwealth plant has 53,600 b/d catalytic cracking capacity, with 7,460 b/d reforming plus 40,300 b/d vis-breaking, a 1,400 b/d alkylation unit, and 2,370 b/d polymerization.

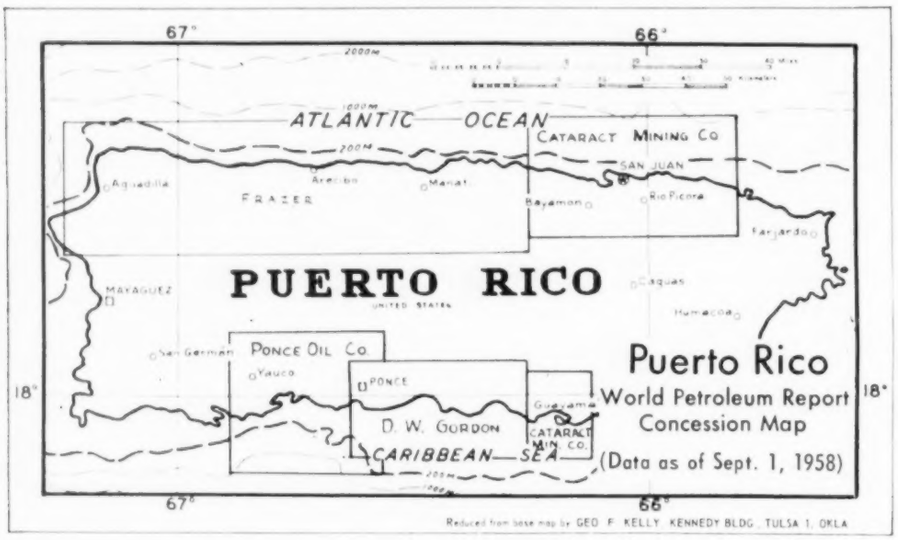
Reportedly, the island's authorities agreed not to permit construction of any more refineries which, because they are not subject to USA import restrictions, are in a very favored position.

OIL LAWS*

Controlling Statutes* include: Regulations for Prospecting, Leasing, and Producing Oil and Gas in Puerto Rico, including Amendments of November 14, 1957; Regulations for Prospecting, Leasing, and Producing Commercial Minerals in Puerto Rico; Industrial Incentives Act of 1954 (Act No. 105, as amended, June 28, 1956).

During late 1957, oil laws were made more attractive, as indicated in the accompanying summary. Changes included a longer exploration and exploitation period and elimination of the checkerboard 64-hectare lease block system.

*Translations of the complete text of all oil laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).



OIL LAW SUMMARY*

Ownership of hydrocarbons is by government.

PROSPECTING: Permit duration, 10 years. Allows surface and geophysical work, but no drilling. Requires a fee of $10 and a bond of $10,000. No rental.

EXPLORATION: 49,418 acres may be granted to one person in one year. Blocks' maximum area of permit, must surrender part of 6,000 ft.

EXPLOITATION: If holder takes lease within area of permit, must surrender part of permit equal to size of lease. Term, 40 years, with renewals to total of 70 years. $50 application fee. Annual rental, $20 each 40-acre "drilling unit," rising to $40 after first year. Drilling must start within six months. Requires a bond of $100,000. **Fiscal:** Exploration costs prior to commercial discovery deducted from rental. One rig must be active on every full lease. Any full lease (3,321 acres) on which no drilling done at end of 10 years must be surrendered. **Royalties:** On a sliding scale from 5% to 16 2/3% depending on individual well output. Oil may be marketed in Puerto Rico, or exported freely.

NATIONAL FACTORS

Puerto Rico is outside the USA federal tax area, and federal income tax does not apply. The local income tax is 20% maximum. The country is also inside the USA sphere, and production obtained would have free access to USA markets without tariff or import restrictions.

The governmental attitude is favorable, and substantial tax incentives are given to investors under "Operation Bootstrap," a program aimed at lifting the island's economy. Labor supply is plentiful, and wages low. END

TRINIDAD

PHYSICAL DEVELOPMENT

EXPLORATION: With most onshore prospects drilled up, exploration has been trending offshore (see *WPR 1957*—p. 247). No outstanding finds were made during 1958, but production continued to increase steadily—the only country in the Western Hemisphere which showed such an increase.

One of the active companies offshore is Dominion Oil Ltd., subsidiary of Standard of California. The company has drilled 22 onshore wells and three offshore in the past six years without finding commercial oil. Offshore, Dominion's drilling operations are unique in that a floating platform is being used. This platform is actually a converted supply barge, the McDermott Tidelands No. 4, held in place on location by six 6,000-lb Danforth anchors. Drilling operations are conducted through a 12-inch-diameter well cut in the center of the barge. The rig was installed on the deck of the barge with its substructure, compound, five-engine Murphy diesel-drive group, C-250 and C-350 pumps, exactly as used in drilling nine previous land wells.

Dominion Oil Co. agreed in late 1958 to pay $5,600 for exploration rights on 1,581 acres, south and east of the island, plus $3.50 per acre for other lands up to 11,000 acres. Drilling will be started within three months after award of leases.

TRINIDAD — Offshore Drilling by Dominion Oil Ltd.

Name of Well	Total Depth (Feet)	Location	Status
Couva Marine	7,732	Lat. 10° 28' 15" N Long. 61° 33' 20" W	Abandoned
Domoil	2,535	Lat. 10° 26' 14" N Long. 61° 48' 17" W	Abandoned
North Brighton	10,874	Lat. 10° 18' 40" N Long. 61° 37' 55" W	Abandoned

Source: Dominion Oil Ltd.

Texaco Trinidad Inc. started drilling in 1958 the first of 36 wells planned for a mammoth permanent platform set in 68 ft of water off the Brighton terminal. The 52-ft by 157-ft drilling platform mounts a derrick which drills six holes from one position, and then skids to another spot for another six holes without another move. Fifty of the 36-in.-diameter concrete piles support the platform. Another 36 piles, driven in parallel lines, will serve as conductor pipes for the wells to be drilled.

PRODUCTION: Levels of production have continued to rise steadily, averaging 102,107 b/d in

(continued)

1958, and hitting 104,628 b/d in October 1958. In 1957, production was also up, 17.8% over 1956 levels. Production in 1957 amounted to 34 million barrels, with 65% coming from 882 flowing wells, 24% from 1,676 pumping wells, and the remaining 11% from 490 air- and gas-lift producers.

TRINIDAD—Crude-Oil Production, 1958
(Barrels Per Day)

January	97,436	July	102,500
February	99,216	August	103,777
March	97,061	September	104,300
April	99,192	October	104,628
May	100,978	November	106,764
June	101,935	December	107,500*

Year (1958) 102,107 b/d (partly estimated)

* Estimated.

Source: Petroleum Department, Trinidad

REFINING: Oil processed by Trinidad's three refineries averaged 138,000 b/d during 1957. A $20 million expansion program will double the capacity of Texaco's 125,000 b/d refinery at Pointe-à-Pierre. The plant's capacity has been increased to the present level from 75,000 b/d in the past two years.

W. R. Grace & Co. is working on plans for a fertilizer plant. The basic unit will be a synthetic anhydrous-ammonia producer using hydrogen derived from locally produced natural gas. Its capacity will be on the order of 100 tons per day. A new company, Federation Chemicals Ltd., will be formed to operate the $16 million plant. In addition, Grace is understood to be planning to invest seven million BWI dollars in other chemical facilities.

MARKETING: The most recent figures indicate 1957 oil consumption of 29,800 b/d, including bunkers. Detailed breakdown is only available for 1956.

TRINIDAD — Historical Drilling Summary

Year	Wells Drilled: Oil	Gas	Dry	Totals
1931	52	—	8	60
1932	51	—	2	53
1933	59	—	1	60
1934	114	—	4	118
1935	118	—	6	124
1936	146	—	12	158
1937	249	—	15	264
1938	255	—	33	288
1939	211	—	17	228
1940	264	—	9	273
1941	275	—	14	289
1942	156	—	7	163
1943	133	—	3	136
1944	96	—	4	100
1945	95	—	5	100
1946	104	—	4	108
1947	141	—	16	157
1948	134	—	7	141
1949	130	—	14	144
1950	136	—	8	144
1951	131	—	9	140
1952	177	—	5	182
1953	211	—	13	224
1954	189	—	13	202
1955	191	—	24	215
1956	224	—	38	262
1957	280	2	22	304
Totals	5,498	2	898	6,398

Source: Petroleum Department, Trinidad.

OIL LAWS*

Controlling Statutes* include: The Land (Oil Mining) Regulations; The Submarine (Oil Mining) Regulations; The Drilling Regulation; The Oil Tanks Regulation; The Petroleum Regulations; The Oil Mining and Refining Regulations; The Petroleum Department and Conservation Board Ordinance; The Petroleum Ordinance; The Oil Mining and Refining Ordinance; The Oil Mining (High Water Tank) Ordinances; The Oil-Field Fires Control Ordinance; The Oil-Bearing Sands (Water Control) Ordinance; The Oil in the Waters of the Colony Ordinance; The Pipeline Ordinance; The Oil Rights (Alien Control) Ordinance; The Mines, Boring, and Quarry Ordinance; The Income Tax (in Aid of Industry) Ordinance (Part III). For a brief summary of the oil law, see *World Petroleum Report—1957*, p. 247.

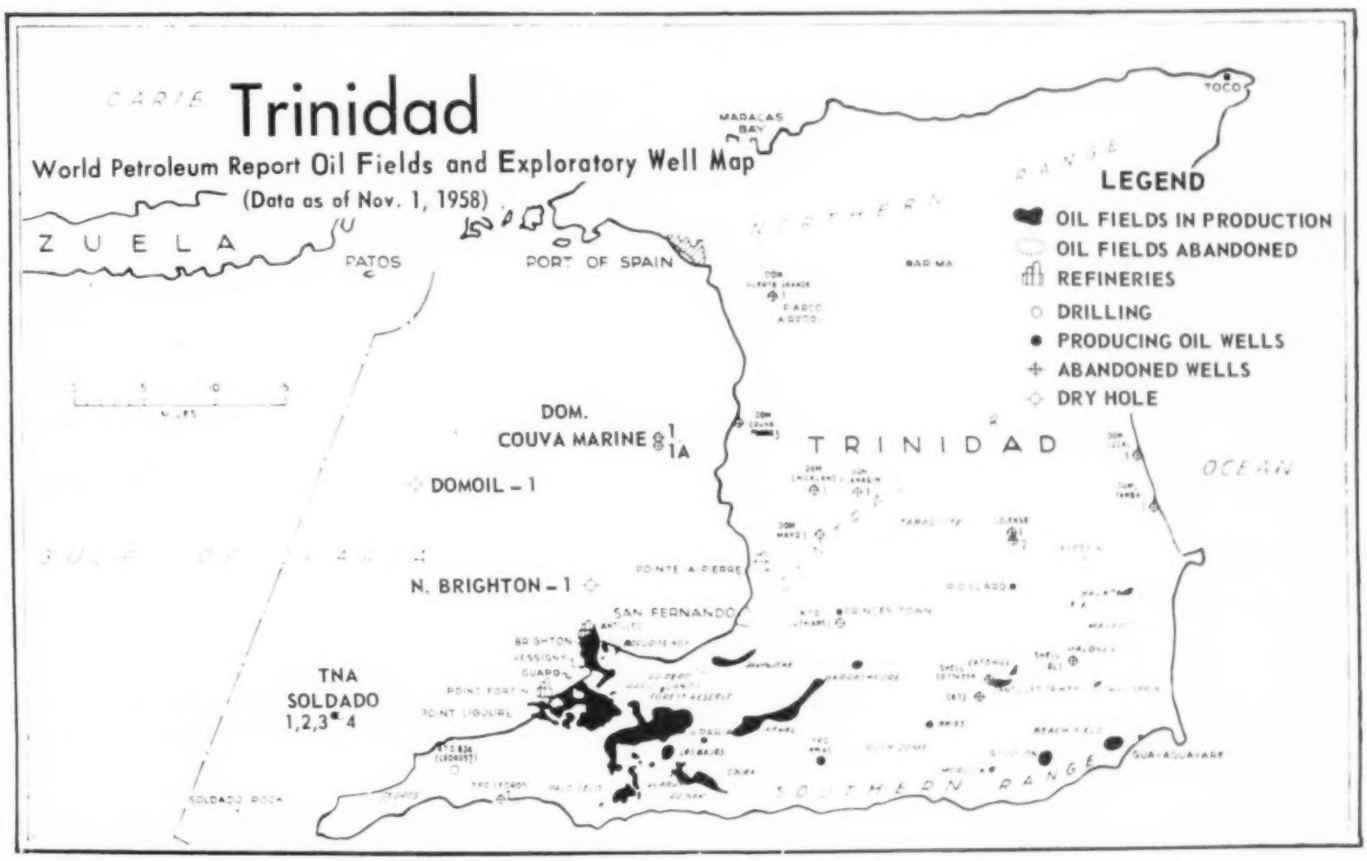
* Copies of these laws are kept on file at the offices of *World Petroleum Legislation Report*, 604 Fifth Ave., New York 20, N.Y. (see p. 22 herein).

TRINIDAD — Operating Refineries
(As of July 1, 1958)
(Barrels Per Day)

Company	Location	Crude Charging Capacity	Type Plant	Cracking Capacity
Brighton Terminal Ltd.	Brighton	5,000	S	—
Shell Trinidad Ltd.	Point Fortin	38,500	SA	—
Texaco Trinidad Inc.	Point-a-Pierre[1]	135,000	SC	64,500 TC

[1]38,000 b/d vis-breaking and 26,500 b/d cat. cracking; 5,000 b/d thermal reforming; 1,400 b/d cat-poly.; 8,000 b/d Platformer; 8,000 b/d Unifining; 60,000 b/d vacuum distillation.

Key to type: S - Skimming, C - Catalytic, T - Thermal.



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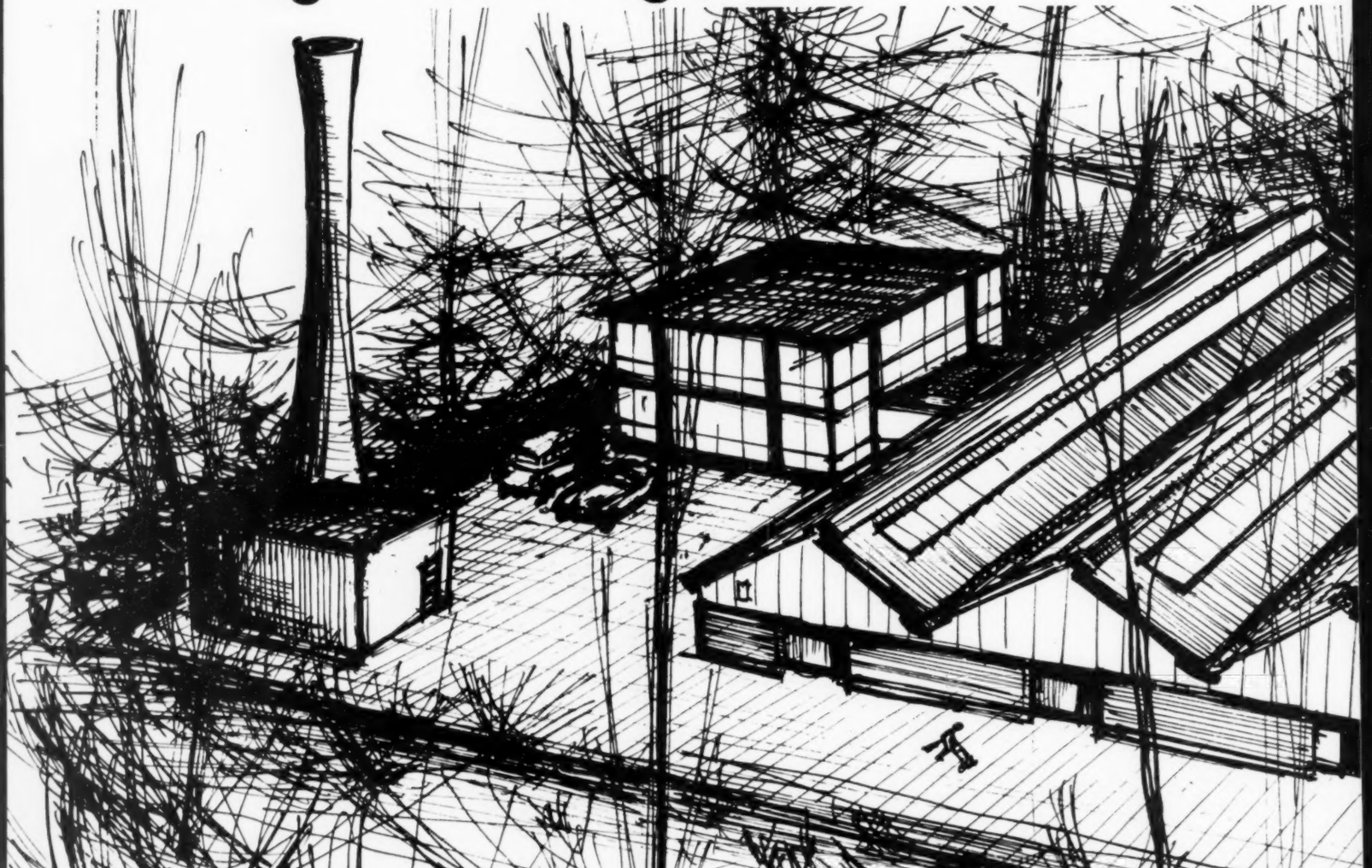

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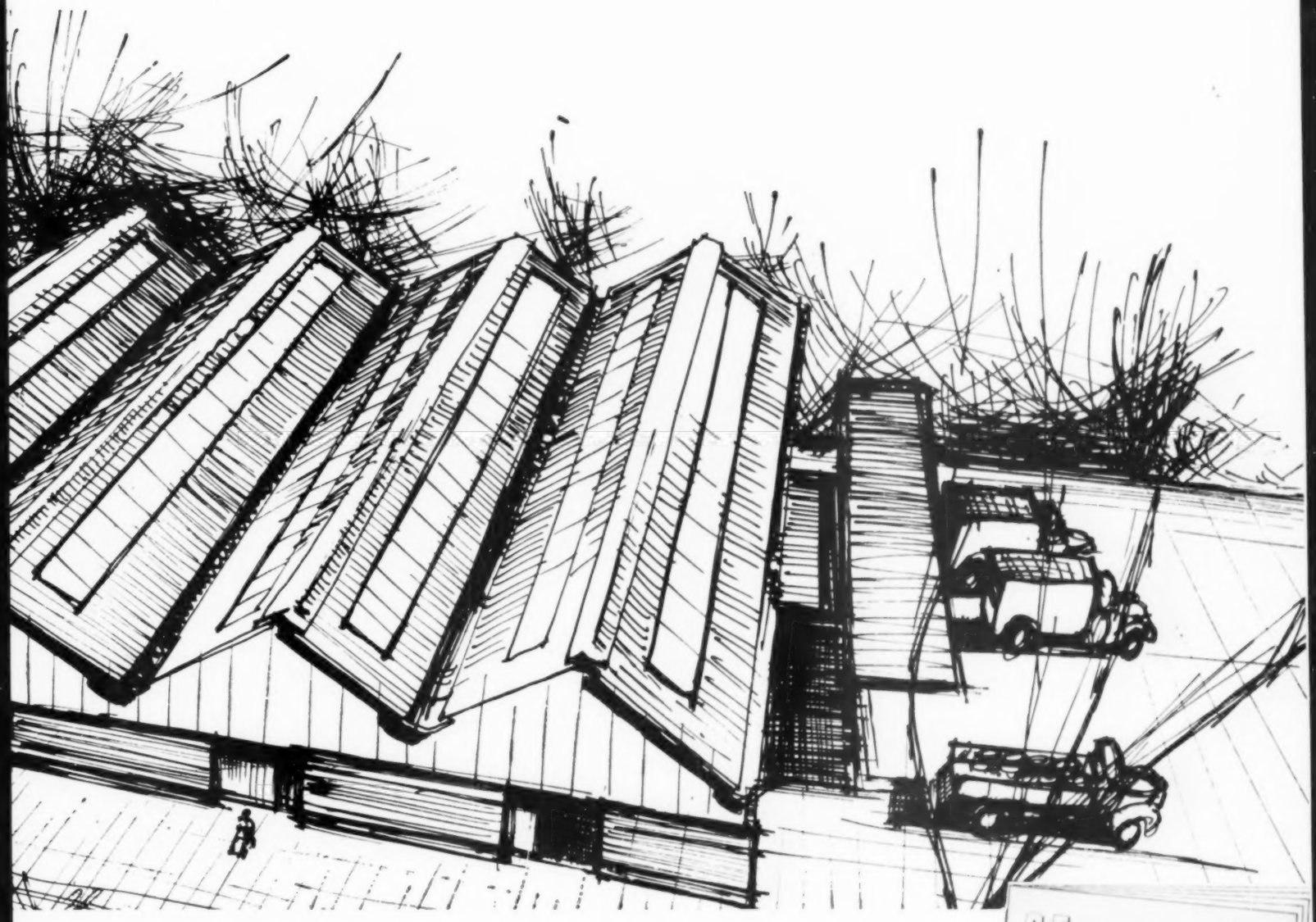

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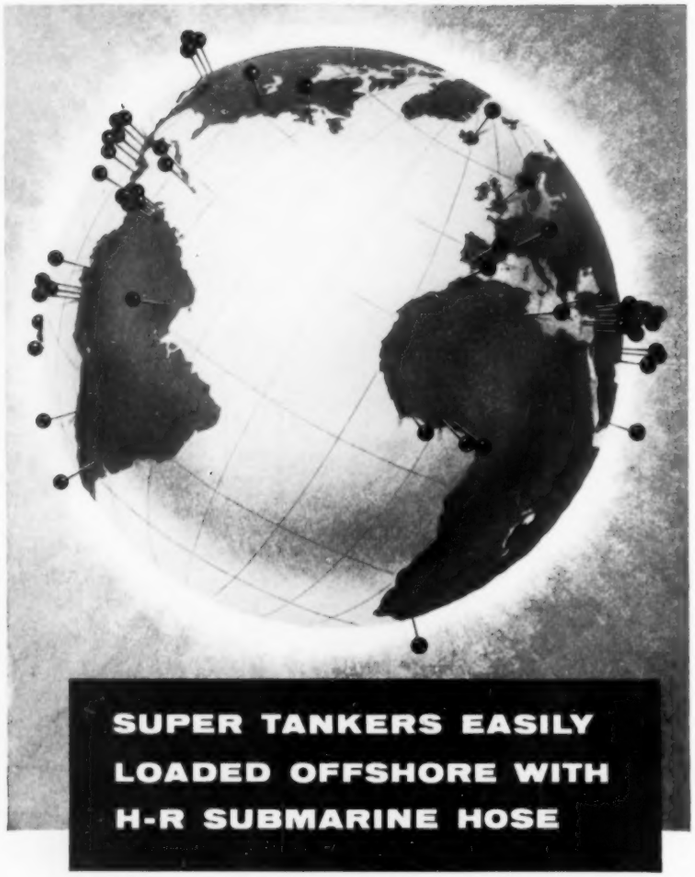

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The Riverhead pipeline is 7,200 feet long. The hose itself (the first East Coast installation) is 175 feet long. It is reinforced with multiple layers of heavy fabric and steel wire, and can take an end-to-end pull well in excess of 115,000 pounds. It withstands high internal pressures from ships' pumps and the external pressure of a 67-foot depth, and resists kinking and flexing action during rough water usage.

H-R submarine hose resists both coral abrasion and rot, and has given over 10 years of continuous service in installations abroad. It is available in sizes up to and including 16" internal diameter. For information or service, contact your local H-R representative, or Hewitt-Robins, Stamford, Connecticut.

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Heads Hughes Research

Henry B. Woods has been appointed director of research of Hughes Tool Co. He has been acting director of research since the retirement of Floyd L. Scott last August, and has been identified with Hughes research and engineering departments for the past 34 years.

Since joining Hughes in 1925, while still a student at Rice, he has held a series of important research positions: chief chemist, 1936 to 1939; laboratory director, 1939 to 1945; assistant director of research from 1945 until his appointment as acting director, last August.

H. B. Woods

C. H. Dresbach

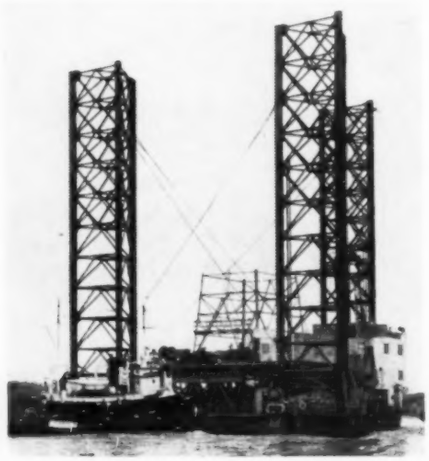
CHARLES H. DRESBACH has been appointed general manager, Bolivian Gulf Oil Co. He succeeds B. F. Hake who is returning to the United States for retirement. Also announced is the appointment of BEN V. FAULKNER as drilling superintendent.

Heavy-End Aluminum Pipe

For use in its under-water flow-line system in Lake Maracaibo, Venezuela, Superior Oil Co. will make the first operational use of the new thick-jointed aluminum pipe developed by Reynolds Metal Co. Superior has ordered 8,000 ft of Reynolds H-E pipe. The heavy-end pipe is extruded to provide extra thickness at the pipe ends where joints are made, while utilizing less metal in the pipe body. The Superior order is for 6-in. pipe in 40-ft lengths, with working pressures equivalent to schedule 80 pipe. Alloy 6061-T6 will be used.

Grove Valve Transfers

Transfer of sales engineers Ted Roby, Jr., from Odessa to Dallas, Texas, and Walter O. Edrington from Chicago to Pittsburgh, has been announced by George E. Doty, vice president of Grove Valve and Regulator Co.



The mobile drilling platform "C. B. Thornton," under lease from Reading and Bates Offshore Co. to International Drilling Co. NV, of Rome, Italy, moved out of the Gulf of Mexico bound for a 110-day tow to the Persian Gulf. The tow, one of the largest ever attempted, is being made by a 4,000-ton Dutch sea-going tug, "The Clyde." It originated at Orange, Texas, upon completion of a $400,000 modification on the 153-ft by 139-ft LeTourneau platform by Levingston Shipyards. The platform will be used to drill offshore for Arabian Oil Co. Ltd., of Japan, which acquired offshore concessions in the Neutral Zone of Kuwait last summer.

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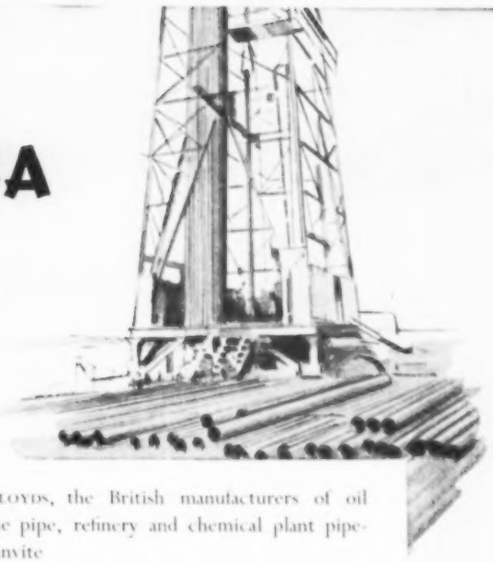

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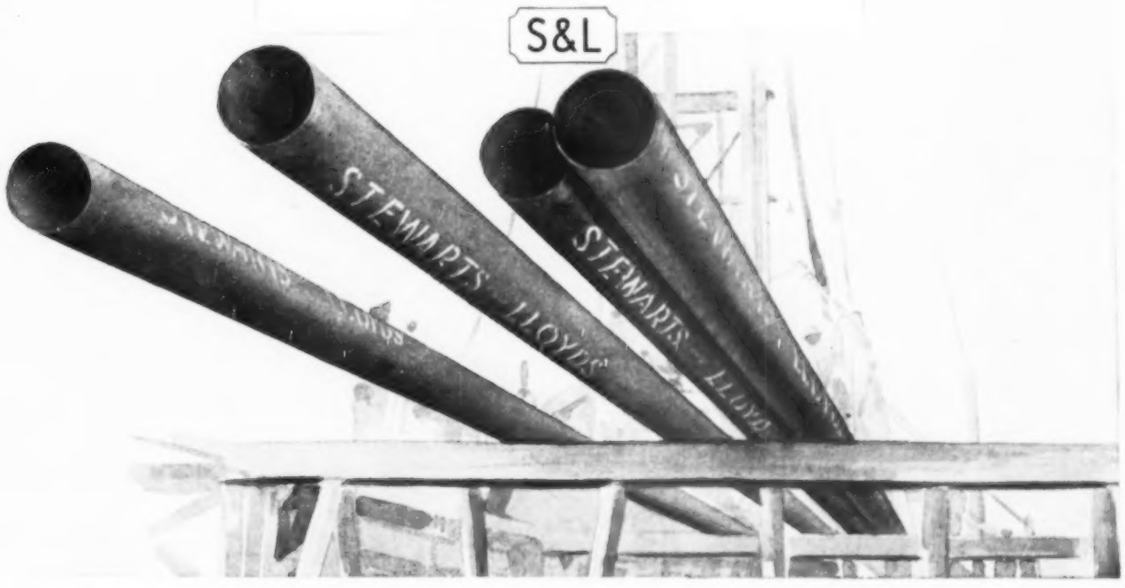

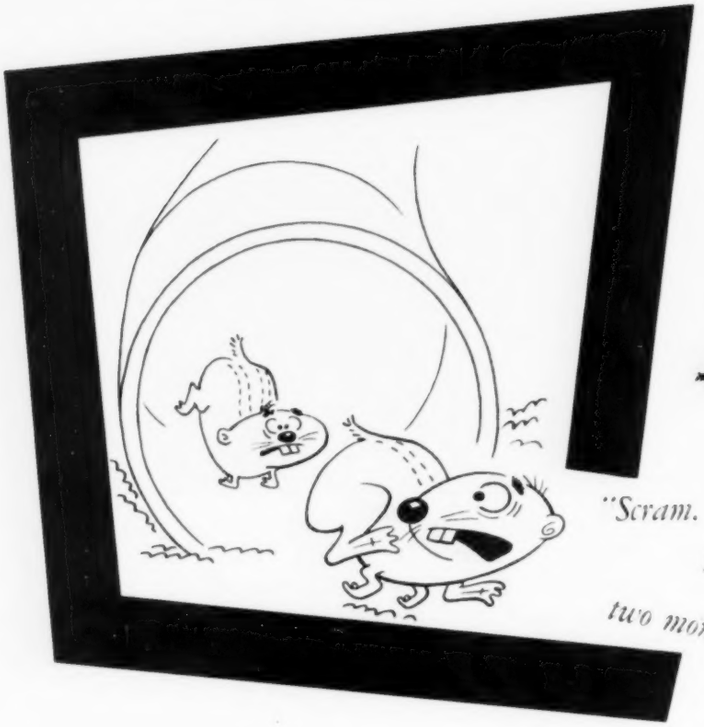

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K/H-29 E

Executives of Perforating Guns Atlas Corp. in attendance at the company's recent annual management conference in Houston.

Well-Servicing Outlook

Paul Charrin, president of Perforating Guns Atlas Corp., in a recent talk to his company's annual management conference at Houston, forecast an increase of 10% in capital outlays this year for drilling and producing facilities to keep them in step with the expected growth demand.

The total footage to be drilled this year may approach the 234 million feet drilled in 1956. The year 1956 also posted a record of 58,271 new holes completed—about 10,000 holes more than are indicated for this year.

"PGAC" was organized in 1946, and by 1955 had outgrown two plants previously occupied and moved to its present 10-acre site at Scott street and Holmes Road, in Houston. The company now operates 45 stations and sales offices in the United States, Canada, Venezuela, Bolivia, and Germany. Employees now number over 500. Subsidiaries of PGAC include: Perforating Guns of Canada Ltd.; Servicios Tecnicos Atlas CA.: Atlas Deutsch-Amerikanische Olfeldienst GmbH; and PGAC Development Co.

Research Center Studies Catalysis

W. R. Grace & Co. has completed a $5 million research center on a 150-acre tract at Clarksville, Md., near Washington, D.C. President of Grace research and development is William P. Gage who for 24 years was with Shell companies. Before joining Grace in 1953, he was vice president in charge of manufacturing for Shell Chemical Corp. Previously he had been Shell's manager of research and development and had served as a supervisor at the Houston refinery. Director of research at Clarksville is Preston L. Veltman, who was assistant research director for The Texas Co. before his wartime work on the Manhattan Project at Los Alamos, N. Mex.

In addition to agricultural chemicals and plastics, an important part of the research at Grace's new center is to be in the field of catalysis. Studies of catalytic cracking, reforming, and desulfurization are in progress.

Automatic, high-pressure fluid and fixed-bed cracking and reforming units have been installed to simulate plant conditions for testing catalyst life and activity. In the field of desulfurization, various catalysts are being studied throughout the range of petroleum fractions. Products of the small-scale units are tested in test engines and through other modern techniques.

Davison Chemical Division of Grace is one of the largest producers of synthetic catalysts for the petroleum industry. It operates plants at Valley Field, Que.; Baltimore, Md.; Lake Charles, La.; and Cincinnati, Ohio.

Westinghouse Far East Director

F. D. Kelly has been named zone director, with headquarters in Manila, the Philippine Republic, for the Westinghouse Electric International Co. He will direct Westinghouse activities in 10 areas in Asia and the Pacific.

Formerly assistant director for the Far East and Middle East sales divisions at New York headquarters, Mr. Kelly's zone responsibilities include the Gilbert Islands, Guam, Hong Kong, Indo-China, Indonesia, Malaya, Sarawak, Singapore, Taiwan, Thailand, and the Philippine Islands. Mr. Kelly joined Westinghouse in New York in 1942.

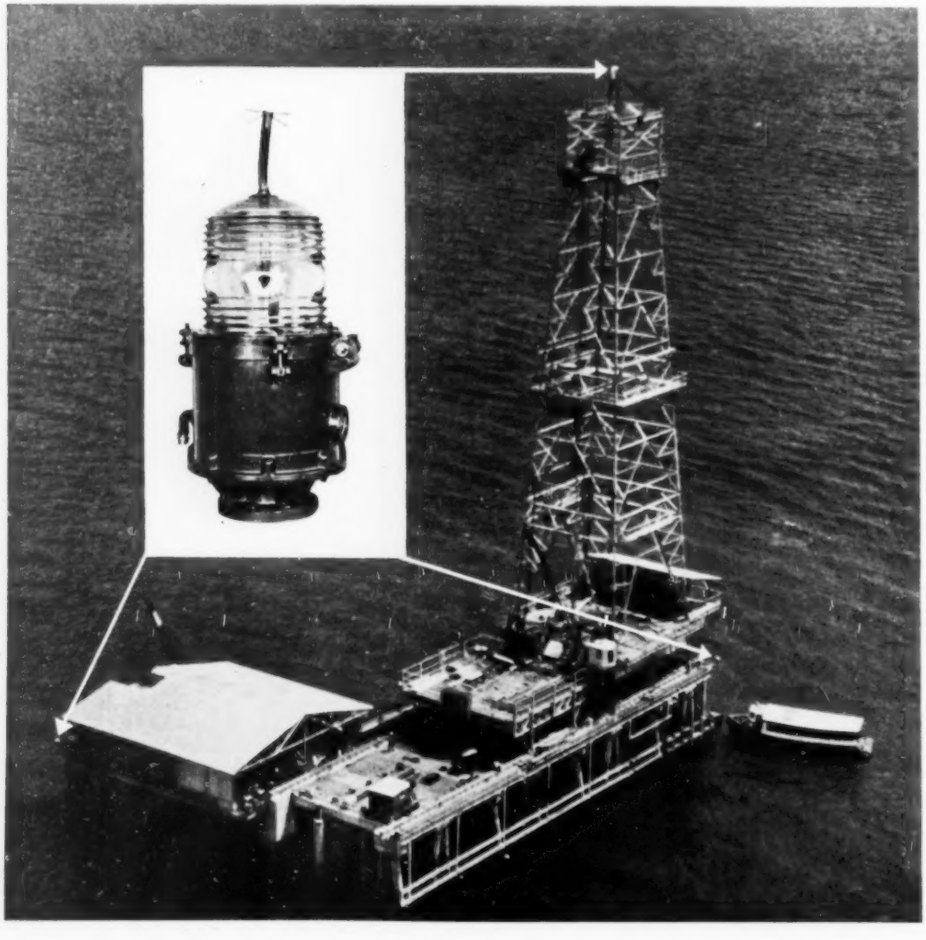
Pipeline Valves

Grove Valve and Regulator Co., Oakland, Calif., has published *Catalog No. G-582*, to describe its cast-steel pipeline gate valves.

Collapsible Van For Overseas

An expandable, collapsible and re-useable cargo van for land and marine freight transportation has been developed by Jaton Products Corp. 700-706 Court St., Brooklyn, N.Y.

Originally marketed in Europe by Holland-Liftvan, The Hague, the vans are said to provide savings of 40% to 70% in labor for packing, 10% to 40% in handling costs, 50% to 70% in insurance premiums for theft and breakage, 25% to 70% in packing material, and 10% to 20% in carriage charges.



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Long-Range Weather Checkup

The November 1958 issue of *World Petroleum* carried a story entitled "A Physical Basis for Seasonal Degree-day Forecasts," by Dr. Irving P. Krick. Along with this article was a series of weather forecasts covering important meetings in the petroleum industry for December 1958 and subsequent months.

At the close of December, the Krick score was 80% with 12 forecasts accurate and three wrong. One forecast scored as wrong was because a predicted stormy period was one day late.

German Refinery Onstream

Shell's new refinery under construction during past four years at Harburg, West Germany, has gone onstream; 40,000 b/d plant will boost Shell's capacity to 60,000 b/d in Hamburg-Harburg area.

Moroccan Oil Shows

First oil shows on disputed Morocco-Algerian frontier have been found at M'Hammid Oasis in two wells drilled for water by Bureau de Réchèrches et de Participations Minières (50-50 Moroccan and French governments). Latter already has applied for rights on 200 square miles in the area.

Persian Gulf Submarine Line

Construction contracts for two submarine pipeline installations in the Persian Gulf have been awarded International Marine Constructors CA, and Collins Submarie Pipelines Overseas Ltd., according to S. V. Collins, president of both firms.

INMARCO will install a 26-mile 30-in. concrete-coated pipeline from Ganaweh, in Iran, to Kharg Island, some 25 miles out in the Persian Gulf for Iranian Oil Exploration & Producing Co. Preliminary work on the project has begun, including the shipment of several million dollars worth of equipment. Across the Gulf, dual 32-in. submarine pipelines are to be constructed by Collins Submarine Pipelines Overseas Ltd. for Basrah Petroleum Co. These two lines link a tank farm at Fao, Iraq, to an artificial island 24.3 miles out in the Gulf. Estimated cost of the combined projects will be in excess of $20 million. Project manager for both jobs is H. C. Frankmann.

Gives Up In Iraq

Iraqi radio reported Basrah Petroleum Co. (subsidiary of Iraqu Petroleum Co. Ltd.) had given up its oil drilling concession in Iraqi territorial waters off Persian Gulf. Radio also reported Iraqi government was negotiating with all other active oil concerns for similar renouncement. "This is to enable the government to exploit the oil resources in offshore areas in the country's best interests."

USSR 40,000-Tonner

Soviet Union's first 40,000-ton tanker with a cargo capacity of 27,000 tons was launched at the Baltic shipyard in Leningrad. The "Peking" has a 10,000-mile radius. Another 40,000-ton tanker has been laid on keel. During the next seven years, a number of tankers with a cargo capacity of 25,000 tons—17,000, 10,000, 4,000, and 1,500 tons, respectively, is to be built chiefly to facilitate the crude-oil export.

USSR Fast Gas Turbine

The Moscow Institute for Machines for the Oil Industry developed a gas-turbine motor with 3,000 hp and more for the operation of slush pumps, compressors, and direct-current generator of a drilling unit, which, in a depth of 3,000 meters (9,843 ft) has a capacity of 1 hp per square centimeter (0.155 sq. in.); this is six to seven times more than in the conventional turbodrill. The drilling time for deep holes in Devonian layers can thus allegedly be cut down to two to three months from 10. The machine can be carried by helicopter, as it weighs only 65 to 70 tons, due to the use of aluminum alloys.

Iranian Oil Revenues

Iranian Finance Ministry estimates total 1958 revenues from consortium oil operations were some 88 million pounds sterling.

China's Crude Production

The Communist Chinese government has announced 1958 crude production was 44,600 b/d—11,000 b/d over the target for the year.

Sicilian Petrochemicals

By end of 1959, an $18 million petrochemical plant will go onstream near Gulf Italia's Ragusa field in Sicily; 50% of the cost will be by the Sicilian regional government.

Albanian Crude Output

Albania's crude output in 1958 is estimated at 546,088 tons (about 11,000 b/d), 11.5% over previous year, or 7% short of planned increase.

Bulgarian Refinery

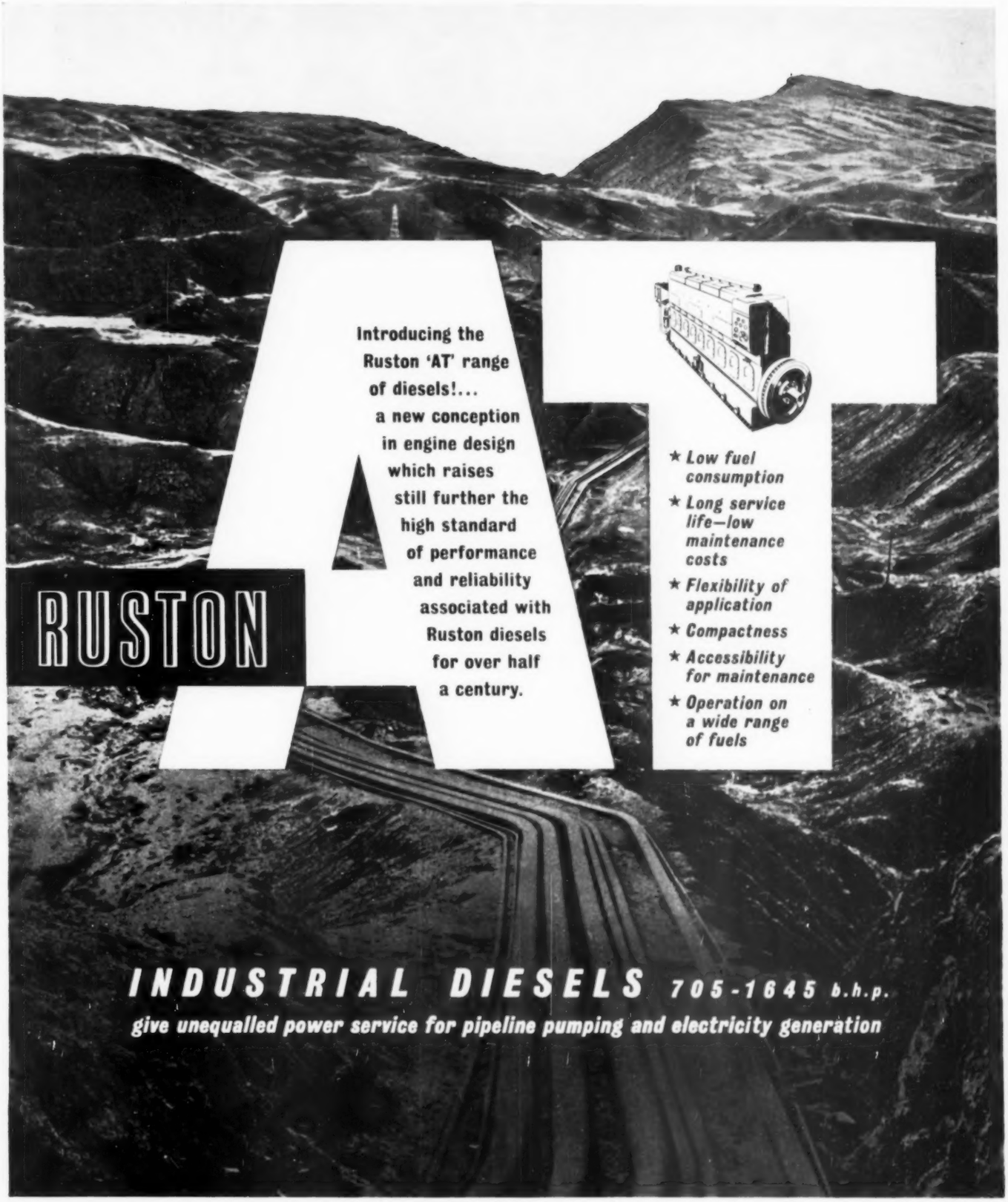
USSR has granted Bulgaria a $32.5 million 10-year credit for construction of a 20,000 b/d refinery to operate on Russian crude.

Afghanistan Search

A Czech team is carrying out oil exploration in Afghanistan under a technical-economic aid agreement.

Hungary's 1958 Oil

Crude output in Hungary in 1958 is estimated at 835,000 tons (about 16,500 b/d)—160,000 tons over 1957. The 227-mile gas pipeline from the Romanian gas field at Sarmas was completed in December 1958 to supply the petrochemical works at Tiszapalkonya in Hungary; annual capacity 7,062 million cubic feet. $57.3 million is to be spent on Hungary's oil industry in 1959; drilled footage to be 935,085 ft against 826,812 ft in 1957.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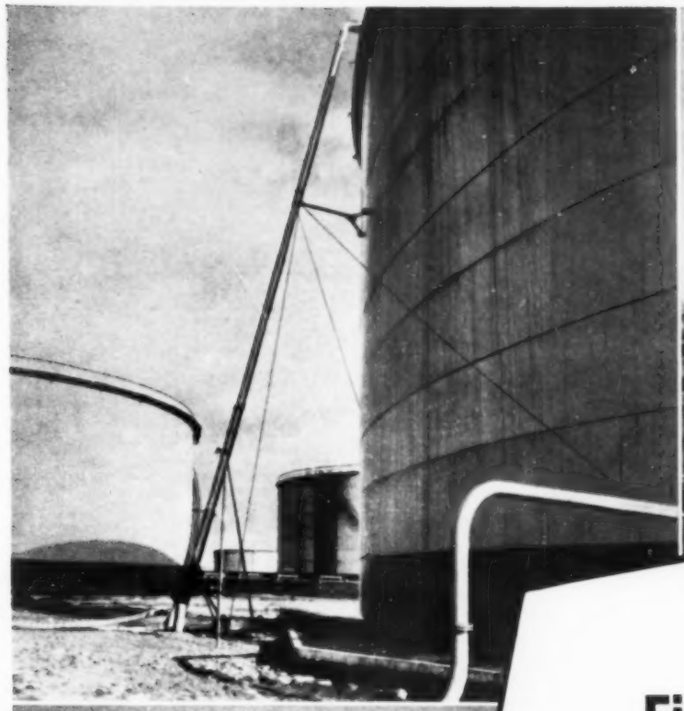

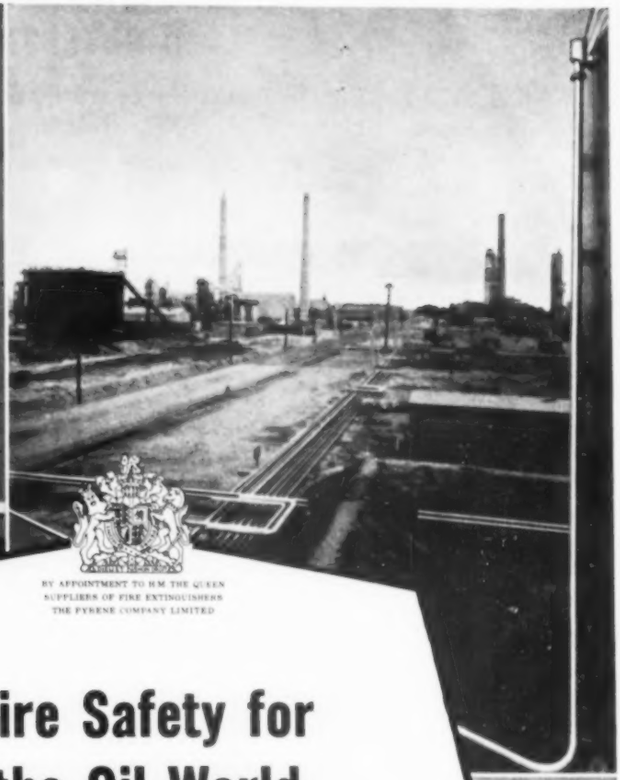

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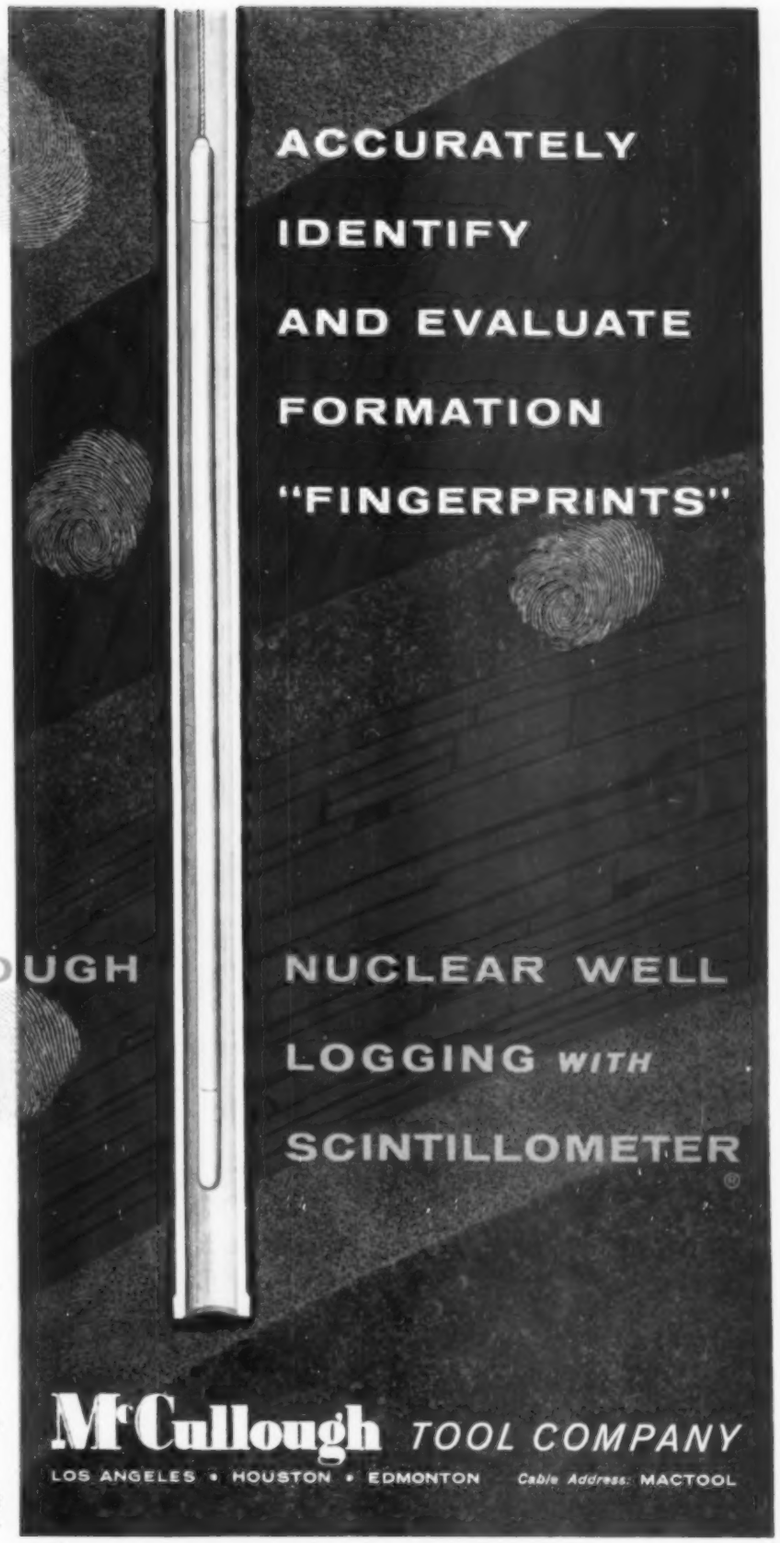

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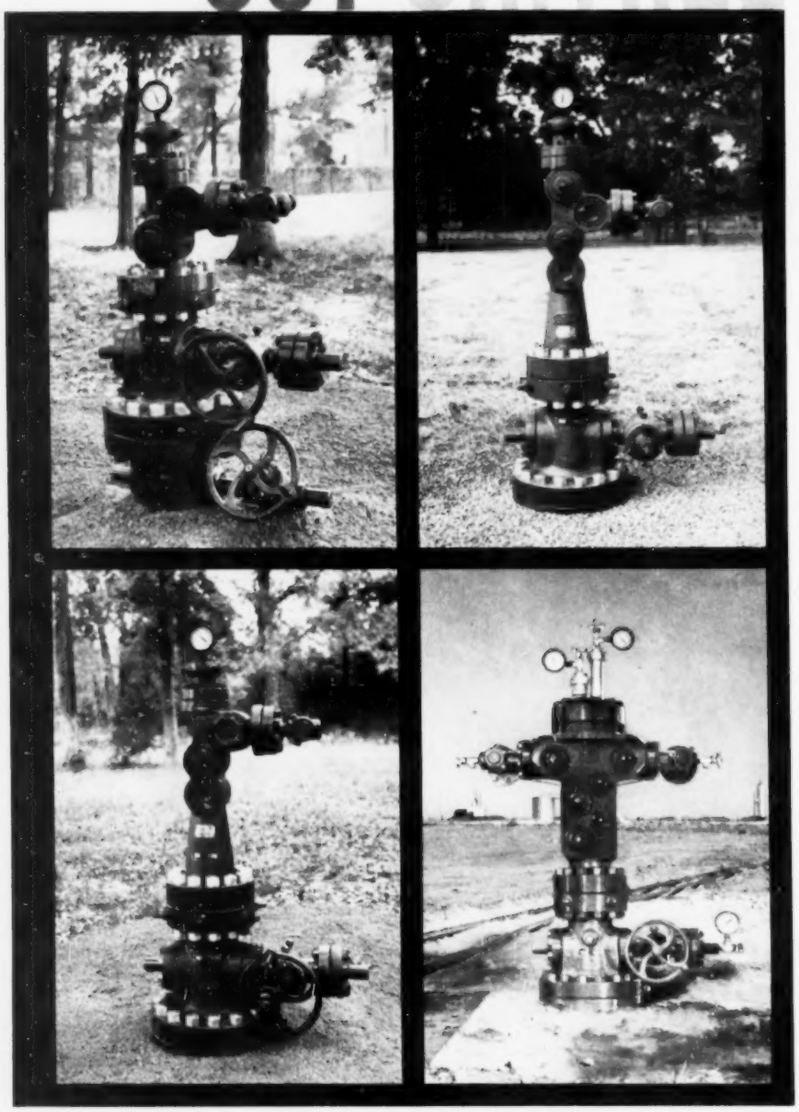

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Unitrees are available in working pressures from 5,000 to 15,000 pounds.

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